WOLCOTT RESERVOIR FEASIBILITY ASSESSMENT

PHASE I INVESTIGATION

JUNE 2004

Wolcott reservoir Feasibility Assessment

phase I Investigation

June 2004

In Cooperation with:

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Colorado River Water Conservation District
Denver Water
Eagle River Water and Sanitation District
Northern Colorado Water Conservancy District
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Section 1 - Executive Summary

The Wolcott Reservoir site is located on Alkali Creek, approximately one mile north of Interstate 70 near Wolcott, Colorado. The site is situated primarily on Federal land administered by the Bureau of Land Management, and upon private property owned by Denver Water. The area can accommodate a large off-channel water storage facility. Previous technical studies have evaluated the development of a large storage reservoir at the site; ranging in size from 160,000 acre feet to 350,000 acre feet. The feasibility of developing a smaller reservoir at the site has been evaluated in this study.

1.1 Study Results

Three reservoir scenarios ranging in size from 55,000 acre feet to 105,000 acre feet have been investigated (Table 1.1). In each scenario, Wolcott Reservoir would be cooperatively operated by East Slope and West Slope participants. Reservoir releases would provide water for environmental uses of the Eagle and the Colorado Rivers. The reservoir would also be used for East Slope and West Slope water supply purposes. Water would not be diverted from the Eagle River watershed to the East Slope. Instead, all East Slope water supplies would be developed by substitution or exchange to other diversion facilities.

Average annual reservoir releases range from about 13,500 acre feet in Scenario A to over 34,000 acre feet in Scenario C. About 80% of the total inflow to the reservoir would be pumped from the nearby Eagle River. The remainder of the reservoir's water supply would originate from Alkali Creek.

Construction of the reservoir is technically feasible. Total construction costs for the reservoir and related facilities are estimated to vary between $135 million and $180 million. Anticipated pumping costs from the Eagle River are approximately $33 to $37 per acre foot of water. Dry year yield from the reservoir will range from about 23,000 acre feet to approximately 47,000 acre feet. The cost of developing this dry year yield is expected to vary from $6,790 per acre foot for scenario A, to about $4,330 per acre foot for scenario C. These costs represent total construction costs, plus the present value of pumping costs divided by the dry year yield.

Table 1.1
Summary of Results
Wolcott Reservoir Investigation

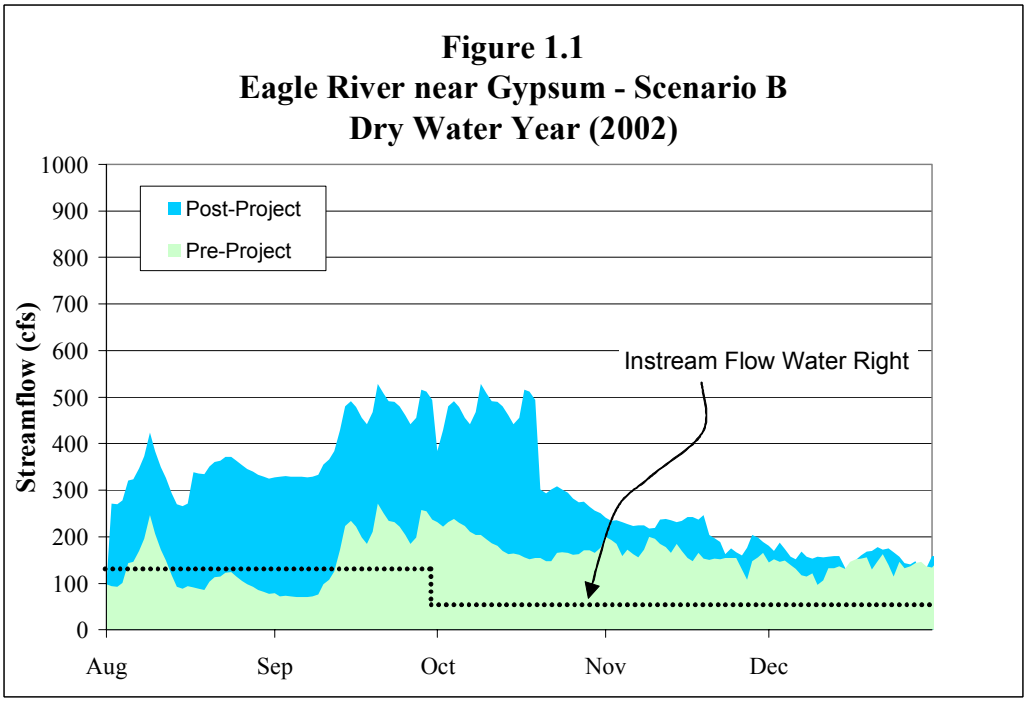
		Scenario A	Scenario B	Scenario C
Water Supply Objectives (Average Annual)	10825 Water	5,412 AF	10,825 AF	10,825 AF
	Denver Water Substitution / Exchange	2,789 AF	5,579 AF	5,579 AF
	West Slope Contract	4,240 AF	4,240 AF	4,240 AF
	Homestake I Exchange	1,006 AF	1,006 AF	1,006 AF
	Camp Hale Exchange	0 AF	1,136 AF	3,343 AF
	Environmental Pool / CFOPS	0 AF	0 AF	9,674 AF
	Total	**13,448 AF**	**22,786 AF**	**34,667 AF**
Facilities	Active Reservoir Capacity	45,000 AF	80,000 AF	95,000 AF
	Total Reservoir Capacity at Normal Pool	55,000 AF	90,000 AF	105,000 AF
	Flood Surcharge Above Normal Pool	20,000 AF	20,000 AF	20,000 AF
	Eagle River Pump and Pipeline	150 cfs	150 cfs	200 cfs
	Surface Area	962 acres	1,225 acres	1,428 acres
	Maximum Dam Height	220 ft	248 ft	260 ft
	Dam Volume	14.3 MMcy	20.5 MMcy	22.5 MMcy
	Highway 131 Relocation	5 miles	5.1 miles	5.2 miles
	Nominal Pumping Head	340 ft	370 ft	390 ft
	Pump Capacity	6,860 HP	7,490 HP	10,380 HP
Water Supply	Eagle River Pumping (Average Annual)	11,790 AF	19,690 AF	31,017 AF
	Alkali Creek Diversions (Average Annual)	3,356 AF	5,176 AF	5,470 AF
	Total	**15,146 AF**	**24,866 AF**	**36,487 AF**
	Firm Reservoir Yield (2002 Water Year)	23,140 AF/YR	40,250 AF/YR	47,200 AF/YR
Cost	Dam and Appurtenances Construction Cost	116 $MM	145 $MM	158 $MM
	Drain and Fill Facilities Construction Cost	19.4 $MM	19.8 $MM	21.8 $MM
	Total	**135.4 $MM**	**164.8 $MM**	**179.8 $MM**
	Storage Cost	2,572 $/AF	1,808 $/AF	1,548 $/AF
	Pumping Energy Cost	33 $/AF	36 $/AF	37 $/AF
	Cost per Acre Foot of Firm Reservoir Yield[1]	6,790 $/AF	4,470 $/AF	4,330 $/AF
Environmental Issues	Eagle River Water Quality	+++	+++	+++
	Colorado River Dissolved Solids - Summer	—	—	—
	Colorado River Dissolved Solids - Fall	+	+	+
	Colorado River Selenium	undetermined	undetermined	undetermined
	Greater Sage Grouse Habitat	— —	— —	— —
	Mule Deer Habitat	neutral / —	neutral / —	neutral / —
	Other Terrestrial Habitat	+ / —	+ / —	+ / —
	Aquatic Habitat - Eagle River	+++	+++	+++
	Aquatic Habitat - Reservoir	+	+	+
	Recreation Use	++	++	++

[1]Present worth of construction and energy cost divided by firm yield

— = Negative Change
+ = Positive Change

The environmental impacts of the reservoir are similar for each alternative. Reservoir releases will substantially increase stream flow of the Eagle River during low flow periods (Figure 1.1). The reservoir will significantly improve water quality and aquatic habitat of the Eagle River downstream of the reservoir site. Adverse environmental impacts associated with the reservoir can likely be mitigated. The inundation of greater sage grouse habitat may be the most significant environmental issue associated with the reservoir.

Figure 1.1
Eagle River near Gypsum - Scenario B
Dry Water Year (2002)



1.2 Recommendations

Many detailed technical and environmental investigations will be required to fully assess the feasibility of the reservoir project. If the study cooperators wish to further investigate the viability of reservoir development, it may be appropriate to initiate studies associated with key environmental issues, or investigations that will require additional data acquisition. These studies include:

- An assessment of any reservoir impacts to habitat of the greater sage grouse
- A water quality sampling program for Alkali Creek
- A more detailed water quality evaluation, with special emphasis on the potential interaction between reservoir storage, local geology and selenium concentrations
- Stream flow monitoring of Alkali Creek
- Geotechnical investigation of whether there are any reservoir/groundwater interactions at the Eagle County landfill

Section 2 - Background

The Wolcott Reservoir site is located approximately one mile north of Interstate 70 near Wolcott, Colorado (Figure 2.1). The site is located within the Alkali Creek watershed, an ephemeral tributary to the Eagle River. The Wolcott dam and reservoir would be located at an elevation of approximately 7,200 feet, and would be situated mainly on private land owned by Denver Water (the 4-Eagle Ranch) and upon Federal land managed by the USDI Bureau of Land Management. A small tract of private land owned by Eagle County is also present at the reservoir site.

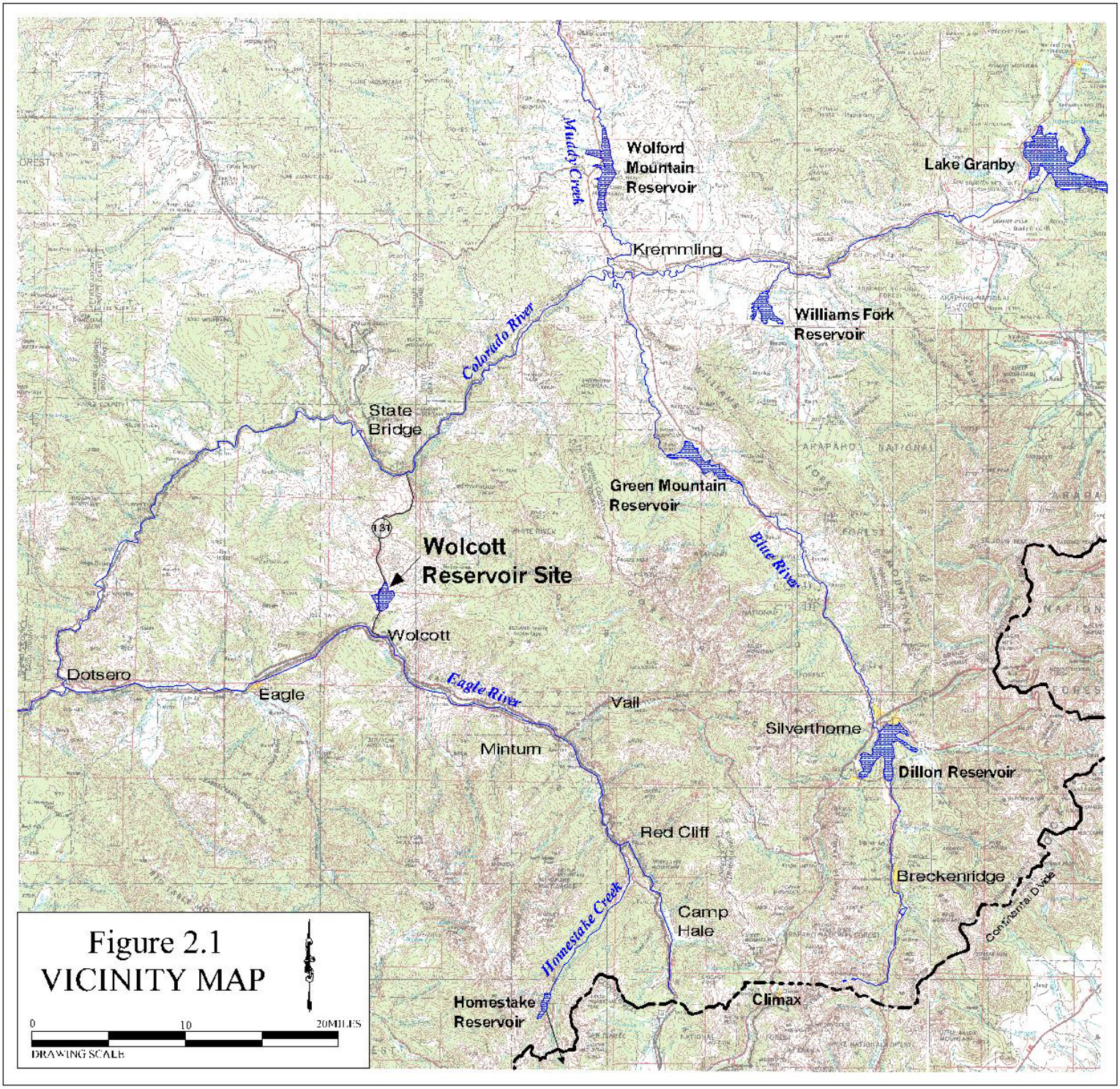
The reservoir area is primarily occupied by undisturbed sagebrush communities, and by partially irrigated hay meadows. Cattle grazing occurs on the site. Narrow riparian corridors also occur in limited areas of the site. State Highway 133 and several county roads dissect the area.

2.1 History and Water Rights

The development of a reservoir at the Wolcott site has been contemplated for many years. In the 1970's, Denver Water decreed a 350,000 acre foot conditional water storage right for a reservoir at the Wolcott location (Table 2.1). This reservoir was decreed as the Eagle-Colorado Reservoir, and is a component of the undeveloped Eagle-Colorado Project. Denver Water also contemplated the diversion of water from other streams in the headwaters of the Eagle River watershed, through the Eagle-Colorado Project and the Eagle-Piney Project.

Table 2.1
Wolcott Reservoir Water Rights

Structure	Amount	Adjudication Date	Appropriation Date	Case No.
Eagle-Colorado Reservoir	350,000 AF	05/31/1972	11/28/1971	CA 2371
Eagle River Pumping Plant	2,500 cfs	05/31/1972	11/28/1971	CA 2371
Colorado River Diversion	3,000 cfs	05/31/1972	11/30/1971	CA 2371
Alkali Creek	40 cfs	05/31/1972	11/28/1971	CA 2371


Muddy Creek
Wolford Mountain Reservoir
Lake Granby
Kremmling
Colorado River
Williams Fork Reservoir
State Bridge
Green Mountain Reservoir
131
Wolcott Reservoir Site
Blue River
Wolcott
Dotsero
Eagle
Eagle River
Vail
Mintum
Silverthorne
Dillon Reservoir
Red Cliff
Breckenridge
Camp Hale
Homestake Creek
Continental Divide
Homestake Reservoir
Climax
Figure 2.1
VICINITY MAP
0
10
20MILES
DRAWING SCALE

The Eagle-Colorado Reservoir, as originally decreed to Denver Water, would be filled with water pumped from the Colorado River near State Bridge and with water pumped from the Eagle River immediately below the reservoir site. The original development concept contemplated that stored water from the reservoir would be used solely for East Slope purposes. Water from the facility was proposed to be delivered to Dillon Reservoir through a series of tunnels, pump stations and other facilities. From Dillon Reservoir, water would be diverted to the East Slope via the existing Roberts Tunnel.

Since the initial adjudication of water rights for the reservoir, several studies have evaluated the feasibility of developing an impoundment at the Wolcott site. These investigations have primarily focused on the development of sizeable reservoirs; ranging in size from 160,000 acre feet to 350,000 acre feet. The development of a reservoir less than 160,000 acre feet in size has not been evaluated in any significant level of detail.

2.2 Purpose of Study

This study evaluates the operation and feasibility of smaller reservoir alternatives than previously studied at the Wolcott site. Results of this evaluation allow the Wolcott Reservoir site to be compared with other storage projects that are currently under investigation. This assessment anticipates that Wolcott Reservoir would be cooperatively used by both West Slope and East Slope interests. The reservoir would be filled with water diverted from the Eagle River and from Alkali Creek during the snowmelt runoff period. No water would be diverted from the Colorado River, and no water from the reservoir would be delivered to the East Slope. Instead, all releases from the impoundment would be made to the Eagle River, primarily during periods of low stream flow.

Reservoir releases would occur for the following primary uses:

- Maintenance of Threatened and Endangered Fish Habitat in the lower Colorado River
- Water Supply for Eagle River and other West Slope Water Users
- Exchange or Substitution to Existing Trans-Mountain Diversion Facilities
- Enhancement of environmental conditions of the Eagle and Colorado Rivers

This investigation identifies the potential timing and magnitude of water demands that may be associated with the primary uses outlined above. In addition, the storage capacity and size of diversion facilities that may be needed to meet these water demands are identified.

Potential development costs and a reconnaissance level investigation of key environmental issues have also been developed.

The water demands outlined in this reconnaissance level study represent a reasonable estimate of potential water supply objectives. However, actual future water demands may vary substantially in response to changes in water right administration or other variables. Additional detailed study may be required to further define water supply objectives associated with the reservoir.

The study has been conducted by Grand River Consulting Corporation and GEI Consultants Inc. Grand River has primarily been responsible for identifying water supply objectives, simulating project operation, and evaluating potential environmental issues. GEI has completed engineering and cost evaluations for the study.

Study participants are City of Aurora, Colorado River Water Conservation District, Denver Water, Eagle River Water and Sanitation District, Northern Colorado Water Conservancy District, Upper Eagle Regional Water Authority, and Vail Associates, Inc.

Section 3 – Water Supply Objectives

In cooperation with the study participants, three specific water demand scenarios for Wolcott Reservoir have been identified (Scenario A, Scenario B, and Scenario C). These scenarios are associated with a range of potential near-term water supply demands. Specific objectives of the three water supply scenarios are summarized in Table 3.1, and are discussed in detail below.

Scenario A is the smallest demand scenario; providing water for threatened and endangered fish habitat (10825 Water), Denver Water substitution and exchange, West Slope contract water, and for exchanges to the existing Homestake I Project (Attachment 1). **Scenario B** provides expanded releases of 10825 Water, and supplies additional releases for Denver Water substitution and exchange. An exchange to a Camp Hale enlargement of the Homestake Project is also included in Scenario B (Attachment 2). The largest water demands are associated with **Scenario C**, in which additional releases of reservoir water are made solely for environmental purposes. (Attachment 3).

3.1 Threatened and Endangered Fish Supply (10825 Water)

The Colorado River Recovery Program was established to supply additional water for threatened and endangered fishes located in the 15-Mile Reach of the Colorado River near Grand Junction, Colorado. The Recovery Program requires the annual release of 10,825 acre feet of water for the maintenance of critical fish habitat, commonly known as 10825 Water. West Slope and East Slope water users are each obligated to provide one half of the annual release (5,412 acre feet).

Currently, the release obligation is supplied from existing West Slope Reservoirs (including Wolford Mountain Reservoir, Williams Fork Reservoir and Ruedi Reservoir) on a short-term interim basis. The interim Recovery Program releases reduce available water supplies at these reservoir facilities, and a long-term alternate source for the 10825 Water is required. As evaluated in this study, Wolcott Reservoir would provide a permanent source of water for this Recovery Program obligation.

Table 3.1 Water Supply Objectives Wolcott Reservoir Study			
Demand	**Scenario A**	**Scenario B**	**Scenario C**
10825 WATER	5,412 acre feet / year ♦ East Slope obligation only ♦ Constant release from Aug 15 to Oct 31 each year	10,825 acre feet / year ♦ East and West Slope obligation ♦ Constant release from Aug 15 to Oct 31 each year	10,825 acre feet / year ♦ East and West Slope obligation ♦ Constant release from Aug 15 to Oct 31 each year
DENVER WATER SUBSTITUTION AND EXCHANGE	Release Pattern Supplied by Denver Water ♦ Variable release from year to year ♦ Maximum Release = 10,000 AF/YR ♦ Average Release = 2,789 AF/YR	Release Pattern Supplied by Denver Water ♦ Variable release from year to year ♦ Maximum Release = 20,000 AF/YR ♦ Average Release = 5,579 AF/YR	Release Pattern Supplied by Denver Water ♦ Variable release from year to year ♦ Maximum Release = 20,000 AF/YR ♦ Average Release = 5,579 AF/YR
EAGLE RIVER / WESTERN SLOPE WATER SUPPLY	5,000 Acre Feet Firm (Dry Year) Supply ♦ Supplement Supply from Eagle Park Reservoir ♦ Releases provided in out-of-priority periods only ♦ Demand pattern based upon existing water use trends	5,000 Acre Feet Firm (Dry Year) Supply ♦ Supplement Supply from Eagle Park Reservoir ♦ Releases provided in out-of-priority periods only ♦ Demand pattern based upon existing water use trends	5,000 Acre Feet Firm (Dry Year) Supply ♦ Supplement Supply from Eagle Park Reservoir ♦ Releases provided in out-of-priority periods only ♦ Demand pattern based upon existing water use trends
EAGLE RIVER EXCHANGES (Homestake I Exchange & Camp Hale Exchange)	Exchange to existing Homestake I Project ♦ Variable daily release ♦ Release based on simulated daily exchange potential	Exchange to Homestake I and Camp Hale Pump back ♦ Variable daily exchange to 50 cfs pump back facility ♦ Release based on simulated daily exchange potential	Exchange to Homestake I and Red Cliff Pump back ♦ Variable daily exchange to pump back facility at Red Cliff ♦ Release based on simulated daily exchange potential ♦ Total diversions by pump back limited to 30,000 AF per MOU
ENVIRONMENTAL POOL (CFOPS Releases or Other Uses)	None	None	Up to 20,000 acre feet / year; average of 10,000 acre feet /year ♦ 1000 cfs release for maximum of 10 days ♦ Releases only when discharge @ 15-Mile reach is between 12,000 cfs and 26,000 cfs

In **Scenario A,** only the East Slope portion of the Recovery Program obligation (5,412 acre feet) will be supplied from Wolcott Reservoir. Under Scenario A, the West Slope portion of the obligation will continue to be supplied from other West Slope facilities. In **Scenarios B and C,** both the East Slope and West Slope portions of the 10825 Water (10,825 acre feet) will be annually released from Wolcott Reservoir.

Releases of 10825 Water are assumed to occur at a constant rate in the simulation model from August 15th through October 31st annually. This pattern of release closely coincides with

current operational practices. The timing of actual releases may vary slightly from year to year, based on stream flow conditions within the 15-Mile Reach. In any event, it is anticipated that the releases will be largely confined to the late summer period.

3.2 Denver Water Substitution and Exchange

Denver Water proposes to operate a portion of Wolcott Reservoir for exchange and substitution purposes. Currently, during out-of-priority periods Denver releases water from either Williams Fork Reservoir or Wolford Mountain Reservoir, and diverts a like amount of water at other West Slope facilities via a substitution or an exchange. Denver Water has identified that additional substitution/exchange sources may be desirable in the future.

Two potential substitution/exchange demands have been evaluated in this study. In **Scenario A**, Denver's maximum exchange release from Wolcott Reservoir is 10,000 acre feet per year. In **Scenarios B and C**, the maximum annual release is 20,000 acre feet per year. The maximum releases occur in drier than average years when exchange/substitution opportunities are the greatest. In many other years, releases for exchange and substitution are substantially reduced. The release demands used in this study were supplied by Denver Water, and are commonly the greatest during the late summer months. The projected monthly distribution of releases for substitution and exchange are in Attachments 1, 2 and 3.

3.3 Eagle River / West Slope Water Supply

Releases from Wolcott Reservoir may be used for water supply purposes within the Eagle River watershed, or at other West Slope locations. The releases would primarily be used to augment out-of-priority diversions by West Slope water users, but may also be directly delivered to water users situated downstream of the reservoir.

A maximum West Slope demand of 5,000 acre feet has been assumed for all three demand scenarios. This demand is based on recent projections by the Upper Eagle Regional Water Authority, Eagle River Water and Sanitation District, and by the Eagle River Assembly. The maximum demand occurs in dry years, when out-of-priority periods may exist during most of the year. In wetter years, the West Slope demand for Wolcott Reservoir releases will likely be reduced.

3.4 Eagle River Exchanges

Water exchanges to both existing and proposed trans-mountain diversion facilities located in the Eagle River watershed have been evaluated.

3.4.1 Homestake I Exchange

The Homestake Project is located in the headwaters of the Eagle River watershed, near Red Cliff, Colorado. The project currently supplies water to the cities of Aurora and Colorado Springs. A portion of the water in Homestake Reservoir (500 acre feet) is also available for West Slope use.

Wolcott Reservoir may be used to facilitate exchanges of water to the existing Homestake Project, or to facilitate exchanges with enlargements of the Homestake Project that may be constructed in the future. The exchanges would typically occur in the mid-summer period of drier than average years when the Project's water rights are out-of-priority to senior water rights located downstream on the Colorado River. At these times, water would be released from Wolcott Reservoir, and a like amount of water would be diverted by exchange by the Homestake Project.

In Demand **Scenario A**, exchanges are made to the existing Homestake Project facilities only. Maximum exchange demands are estimated to be about 6,500 acre feet in critically dry years. In most average and wetter than average years, no exchange to the Homestake Project would occur because of local hydrologic conditions (Attachment 1).

Existing exchanges to the Homestake Project currently occur in association with releases from either Wolford Mountain Reservoir or Green Mountain Reservoir. These exchanges are typically less then 800 acre feet per year. In each demand scenario, it is assumed that Wolcott Reservoir will become the source of replacement water for these existing exchanges.

3.4.2 Camp Hale Exchange

In Demand **Scenario B,** it is assumed that the Homestake Project is enlarged to include a 50 cubic foot per second pumping facility from the Eagle River near Camp Hale. This enlargement would annually divert an average of about 7,600 acre feet of water in-priority.

The Camp Hale enlargement may also divert additional water through an exchange with Wolcott Reservoir. It is estimated that maximum exchanges to the Camp Hale Pump Facility may be about 3,100 acre feet in critically dry years. The maximum cumulative exchange to the existing Homestake Project and to the Camp Hale enlargement is estimated to be about 9,600 acre feet in critically dry years (Attachment 2).

In Demand **Scenario C**, it is assumed that the Homestake Project is enlarged to include a major pumping facility from the Eagle River near Red Cliff. Pursuant to the Eagle River Memorandum of Understanding, this enlargement would annually divert an average of about 30,000 acre feet of water. A portion of this yield would be derived during out-of-priority periods through an exchange with Wolcott Reservoir. It is estimated that maximum exchanges to the Red Cliff pump facility may be about 9,900 acre feet in critically dry years (Attachment 3).

3.5 Environmental Pool / CFOPS Water

The development of an environmental reservoir pool has been evaluated in Scenario C. This reservoir pool could be used for a variety of environmental uses. For purposes of this study, we have assumed that the environmental pool could be used to support the Coordinated Facilities Operations Study (CFOPS). However, environmental uses from the reservoir would not be limited to this objective.

The Coordinated Facilities Operations Study investigates alternatives for supplying up to 20,000 acre feet of water to the 15-Mile Reach of the Colorado River. The objective of this study is to enhance spring runoff to meet water needs for four species of endangered fish in the Upper Colorado River Basin.

It has been estimated that a flow rate in the 15-Mile Reach between 12,900 cfs and 26,000 cfs will mobilize gravel/cobble substrates, and create and maintain fish habitat (Seaholm, 2003). For this study, CFOPS releases are made from Wolcott Reservoir during those study years when the projected discharge of the Colorado River at the 15-Mile Reach is between 12,900 cfs and 26,000 cfs for a 10-day consecutive period. In these years, annual releases of 20,000 acre feet are made from the reservoir at a rate of 1,000 cfs for a 10 day period. The releases

are made in **Scenario C** only, and occur in 28 of the 57 years in the study period. CFOPS releases are not provided in **Scenarios A and B**.

Releases for the CFOPS program are estimated to average about 10,000 acre feet per year. As outlined above, these releases could also be made for other environmental objectives.

3.6 Eagle River Stream Flow Enhancement

During the late summer months of dry years, the discharge of the Eagle River downstream of Wolcott Reservoir has historically been lower than instream flow amounts decreed to the Colorado Water Conservation Board. These instream flow rights were decreed to protect the environment of the Eagle River to a reasonable degree. When streamflow is less than the desired instream flow amounts, it is primarily the result of naturally occurring drought or low flow conditions. Water diversions may also contribute to instream flow issues, although to a lesser degree.

Reservoir releases to the Eagle River for the objectives previously described (10825 releases, substitution, ect.) will cause a substantial increase in stream flow below Wolcott Reservoir during low flow periods. Simulation results for each of the three demand scenarios indicate that recommended instream flows will be maintained at all times following these reservoir releases (Figure 1.1). Accordingly, it may not be necessary to make additional reservoir releases solely for the purpose of maintaining stream flow conditions in the Eagle River below Wolcott Reservoir. In this study we have assumed that any additional environmental releases would likely be made for objectives other than the maintenance of Eagle River streamflow.

3.7 Summary of Water Demands

Total Wolcott Reservoir releases for the three demand scenarios are outlined in Table 3.2. Average annual releases vary from about 13,450 acre feet in Scenario A to about 34,650 acre feet in Scenario C. The monthly distribution of total reservoir releases is summarized in Attachments 1, 2, and 3. Maximum reservoir releases are simulated to occur in critically dry years such as 1954, 1977 and 2002. The maximum dry year releases range from about 27,000 acre feet in Scenario A to about 54,000 acre feet in Scenario C.

Table 3.2
Summary of Wolcott Reservoir Releases [1]
Acre Feet per Year

Water Supply Objective	Scenario A		Scenario B		Scenario C	
	Maximum	Average	Maximum	Average	Maximum	Average
10825 Water	5,412	5,412	10,825	10,825	10,825	10,825
Denver Water Substitution / Exchange	10,000	2,789	20,000	5,579	20,000	5,579
West Slope Contract	5,000	4,240	5,000	4,240	5,000	4,240
Eagle River Exchanges –						
• Homestake I Exchange	6,573	1,006	6,573	1,006	6,573	1,006
• Camp Hale Exchange	0	0	3,139	1,136	9,917	3,343
Environmental Pool (CFOPS)	0	0	0	0	20,000	9,674
Total	26,985[2]	13,448	45,443[2]	22,786	53,474[2]	34,667
Total Yield of new Upper Eagle River Pumping Facilities (Homestake)		0		8,755		30,000

[1]Based on a 1947 to 2003 study period
[2]Maximum releases for each water supply objective do not occur concurrently

Section 4 – Wolcott Reservoir Facilities

The three water demand scenarios previously identified can be supplied by reservoirs of many different capacities. Specifically, the amount of water that can be supplied by Wolcott Reservoir will vary in relationship to reservoir capacity, and to the size of the Eagle River pump station and pipeline that would divert water into the reservoir. A relatively small reservoir with a large capacity pump and pipeline may be able to provide the same water supply as a larger reservoir with a smaller pump and pipeline.

4.1 Simulation Model

Facility options for the three demand scenarios have been evaluated with a daily simulation model of the Eagle River watershed. The model simulates reservoir and pipeline operation for the historical 1947 to 2003 period. Key operational parameters considered in the model include:

- Colorado River Main Stem Water Rights
- Instream Flow water rights on the Eagle River
- Native Streamflow of the Eagle River
- Native Streamflow of Alkali Creek
- Schedule of Wolcott Reservoir Releases
- Operation of the Homestake I Project
- Operation of other Eagle River projects (Homestake Enlargements)
- Reservoir Evaporation
- Reservoir Capacity
- Pump and Pipeline Capacity

The operational simulation used in this study is based upon the historical hydrologic conditions that occurred from 1947 through 2003. Within this study period, simulation results reflect that the critical limiting supply period for Wolcott Reservoir is typically the 2001 to 2003 period, although the 1954 to 1956 period may also be limiting under certain project configurations. Actual water supply opportunities will vary in response to climatic conditions that occur in the future. If future climatic conditions are drier than those that have occurred in the 1947 and 2003 period, it is possible that the yield of the Wolcott Reservoir may be less than outlined in this report.

Study results are also influenced by operating assumptions used in the model. Important model operating criteria are discussed below.

(1) Wolcott Reservoir is operated as the most junior water right within the upper Colorado River watershed (a 2004 priority date). Diversions into the reservoir are subject to frequent curtailment by senior downstream water rights including the Cameo and Shoshone demands.

(2) Even though the actual decreed water rights for the facility are senior in priority, the project is operated as junior to all instream flow water rights decreed to the Colorado Water Conservation Board. Reservoir diversions occur only when stream flow exceeds appropriate instream flow values.

(3) The exchange of water from the reservoir to upstream diversion facilities in the Eagle River watershed (Homestake Project) is also operated as junior to the Colorado Water Conservation Board instream flow water rights.

(4) Reservoir releases for West Slope contract use are made only when a downstream water right call is in place.

(5) A single reservoir pool has been simulated. All reservoir releases are made from this single pool, although the releases are made for different purposes and for different cooperating parties. Under this simplifying assumption, the reservoir is operated very efficiently and water may be periodically borrowed from one party's portion of the reservoir to satisfy the demands of another party.

4.2 Simulation Results

Results of the assessment reflect that the water supply objectives of **Scenario A** can be supplied in all study years with an active reservoir capacity as small as 30,000 acre feet (Figure 4.1). Year to year carryover storage is nominal with a reservoir of this small size, and a relatively large pump and pipeline (about 250 cfs) is required to supply the reservoir during each snowmelt runoff period. With 50,000 acre feet of active capacity, a pipeline as small as 50 cfs may provide adequate water supplies to accomplish the objectives of Scenario

A (Figure 4.1). Simulation results reflect that the minimum active storage content throughout the study period is about 5,000 acre feet, given a 50,000 acre foot reservoir and a 50 cfs pump station. With the larger reservoir, more carryover storage is available and a smaller pump station is possible.

In **Scenario B**, we estimate that a reservoir with at least 65,000 acre feet of active capacity may be required (Figure 4.2). With a reservoir of this size, a pump station capacity in excess of 200 cfs is required to supply projected water demands during the entire study period. Larger reservoir sizes may be appropriate to provide carryover storage and to maintain reasonable storage contents for recreational purposes. With 80,000 acre feet of active capacity and a 150 cfs pump station, simulation results reflect that the minimum active storage content will exceed 10,000 acre feet at all times (Figure 4.2).

Increased environmental and water exchange demands in **Scenario C** require the development of larger reservoir facilities. We estimate that an active reservoir capacity of approximately 95,000 acre feet or more will be required to meet the objectives of this scenario (Figure 4.3). These objectives include an

Figure 4.1
Scenario A
Minimum Active Content (1947-2003)

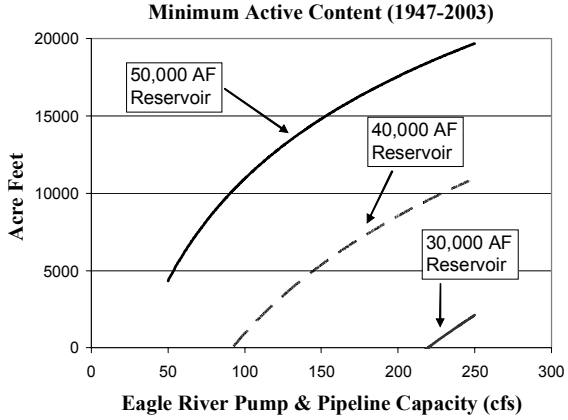


Figure 4.2
Scenario B
Minimum Active Content (1947-2003)

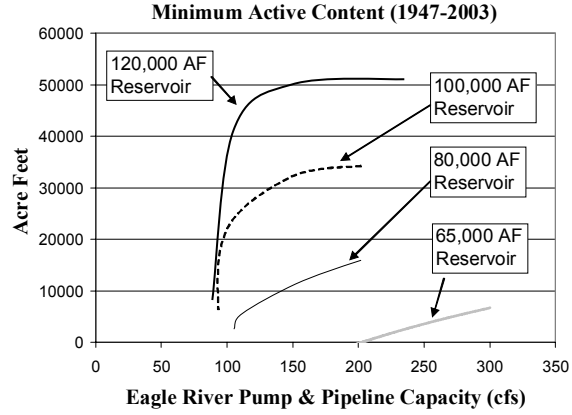
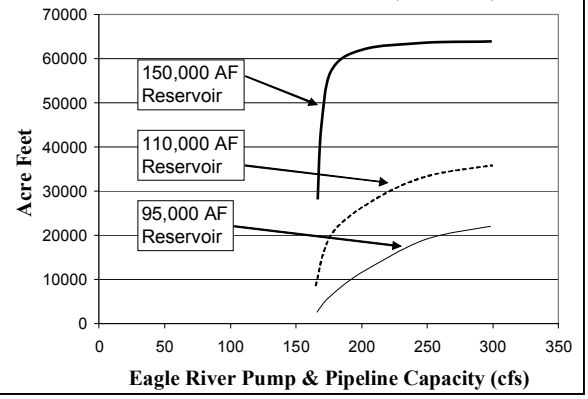


Figure 4.3
Scenario C
Minimum Active Content (1947-2003)



average annual reservoir release of about 10,000 acre feet for environmental purposes. Environmental uses may be associated with the CFOPS program or other environmental uses. Larger reservoir capacities will result in additional carryover storage, and in a greater recreation pool in the reservoir. A larger Eagle River pump station capacity is also required for this demand scenario. Simulation results reflect that a pump station capacity in excess of 175 cfs is required to allow the reservoir to refill during extended drought periods. If pump station capacity is less than 175 cfs, Wolcott Reservoir is not able to meet the water supply objectives of Scenario C, even if the reservoir capacity is substantially increased.

4.3 Recommended Project Facilities

Specific reservoir and pipeline capacities have been developed in consultation with the study participants. The primary facilities associated with each water demand scenario are summarized in Table 4.1 and illustrated on Figure 4.4.

Selected active reservoir capacities are generally about 10,000 to 15,000 acre feet greater than the minimum storage volume required to satisfy each demand objective. The larger reservoir sizes will provide enhanced recreation and conservation pool benefits. Also, as previously outlined a single reservoir pool has been simulated which allows the reservoir to be operated very efficiently. If the reservoir were to be constructed, it is likely that each cooperating party may desire its own individual pool. In this event, it may not be possible to borrow water from one pool to satisfy the demands of another cooperator. As a result, actual reservoir storage may need to be somewhat greater than the estimated minimum capacity.

Also, please note that total reservoir capacity exceeds active capacity by 10,000 acre feet. We anticipate that this "conservation pool" will provide for approximately 100 years of sedimentation from the Alkali Creek watershed.

Table 4.1
Recommended Project Facilities

	Scenario A	Scenario B	Scenario C
Active Reservoir Capacity (AF)	45,000	80,000	95,000
Total Reservoir Capacity (AF)	55,000	90,000	105,000
Eagle River Pump and Pipeline (cfs)	150	150	200
Surface Area (acres)	962	1,225	1,428

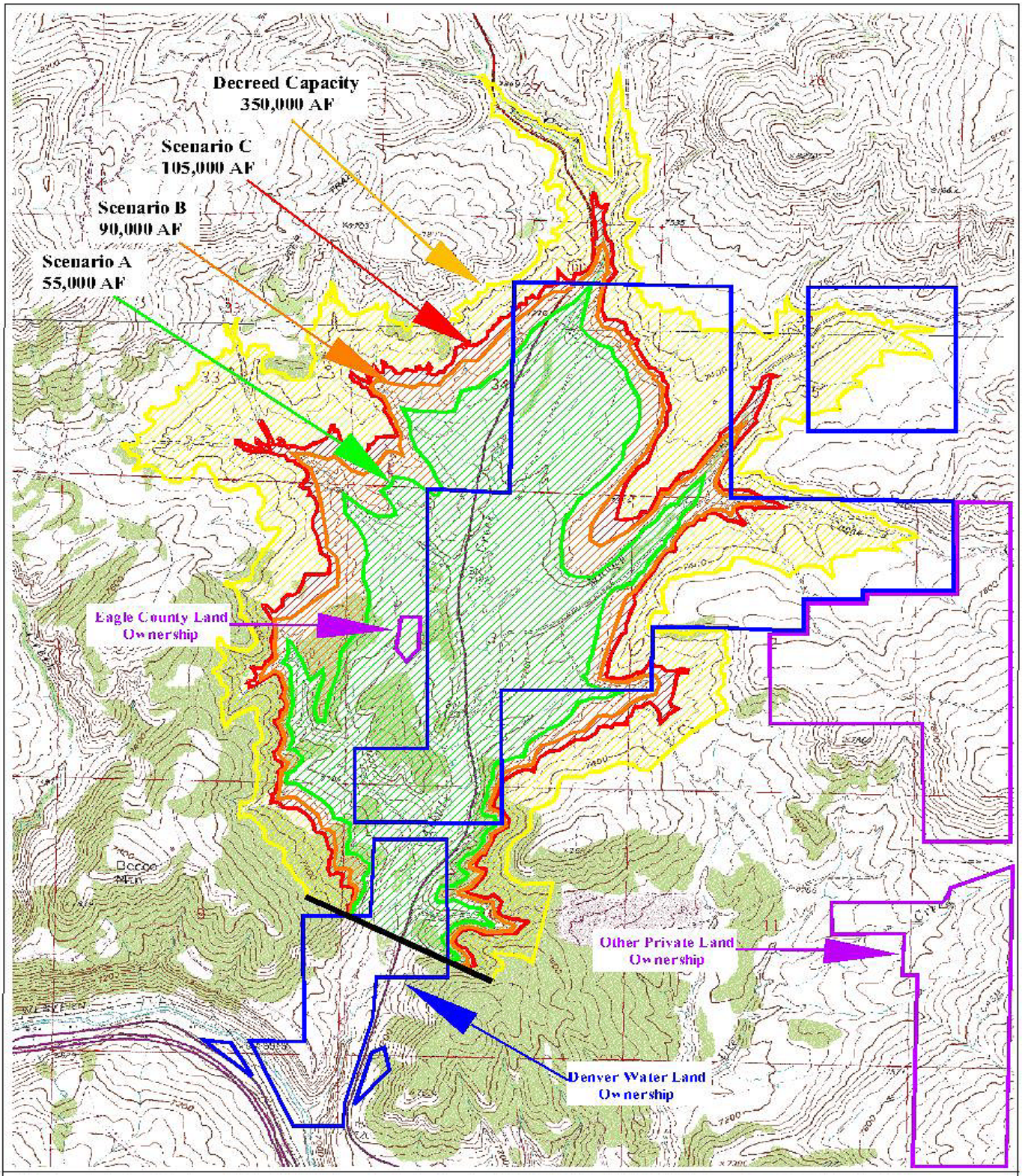


Figure 4.4
Wolcott Dam & Reservoir Scenarios
Total Reservoir Capacity

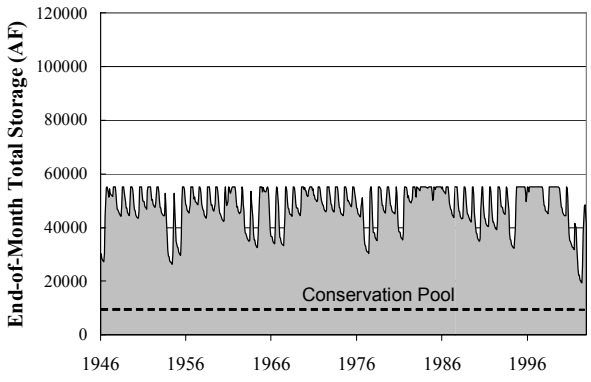
Section 5 – Wolcott Reservoir Operation

The operation of Wolcott Reservoir would change stream flow of Alkali Creek, the Eagle River and the Colorado River. Diversions of water into storage during the spring and early summer months will reduce stream flow. Subsequent reservoir releases will increase stream flow during the late summer months and during winter low flow periods. Projected reservoir storage levels, and simulated changes in stream flow are outlined in this section.

5.1 Reservoir Storage Content

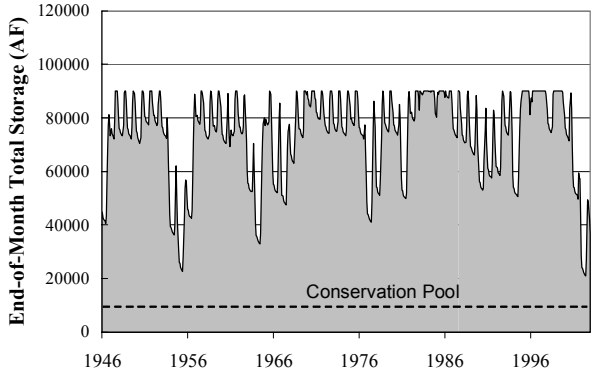
Reservoir storage will vary considerably over time. Under all three scenarios, it is anticipated that Wolcott Reservoir will commonly fill to capacity during the snowmelt runoff period. In **Scenario A** the least amount of water is required to fill the reservoir, and in-priority diversions from the Eagle River are projected to fill the reservoir in all but the driest years such as 1954, 1977, and 2002 (Figure 5.1).

Figure 5.1
Scenario A
55,000 AF Total Capacity
150 cfs Pump & Pipeline Capacity

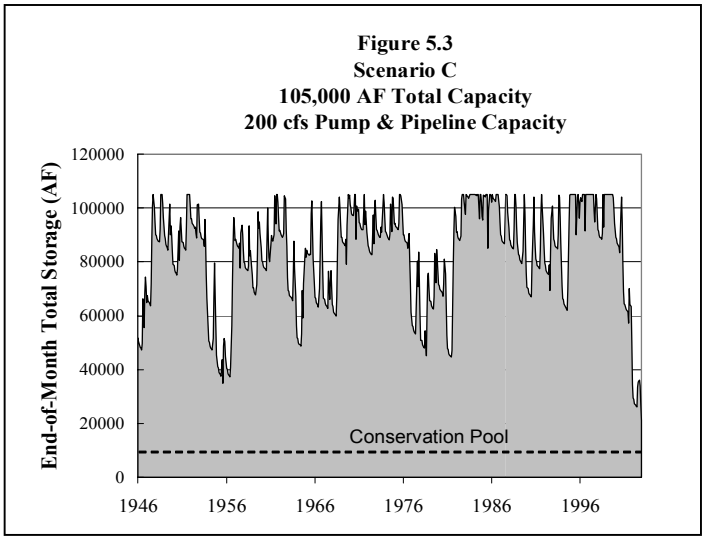


Increased water demands in **Scenario B** will result in additional reservoir drawdown (Figure 5.2). During droughts, such as from 1954 to 1956 and from 2001 through 2003, insufficient Eagle River water will be available in-priority to refill the

Figure 5.2
Scenario B
90,000 AF Total Capacity
150 cfs Pump & Pipeline Capacity



reservoir. Accordingly, several multiple year periods are projected to occur in which the reservoir will not be filled to capacity.



Simulation results indicate that in **Scenario C**, the reservoir will fill to capacity in less than half of the study years (Figure 5.3). During extended droughts such as in the mid 1950's, the reservoir may be less than one-half full for several consecutive years. During relatively wet periods such as the mid 1980's through the 1990's, the reservoir will fill to capacity routinely.

Within each year, the reservoir will commonly be at its lowest level in late spring, prior to the onset of snow melt runoff. As discussed above, the lowest overall storage levels are generally simulated to occur during the multiple year droughts that historically occurred from 1954 to 1956 and from 2001 to 2003.

5.2 Diversions into Storage

Water will be diverted into storage from either Alkali Creek or the Eagle River (Attachment 4). Water will be stored during the snowmelt runoff period when the junior rights for the reservoir are in-priority. In average years, the project would divert water primarily from May through July. Outside of this period, the water rights for the reservoir will be curtailed by senior water right calls originating from either the Shoshone Hydroelectric Plant or from irrigation rights in the Grand Valley.

Simulated diversions into storage are summarized for each demand scenario in Attachment 4. The majority of diversions into storage will originate from the Eagle River (Table 5.1). Diversions from Alkali Creek will be limited because of the small amount of runoff that originates from this low elevation watershed. The water yield from Alkali Creek has been simulated with a water balance approach that considers watershed area, elevation and aspect. On-site stream gauging will be required to refine runoff estimates for the area.

The largest amount of project diversions will generally occur in those years that follow a drier than average year. At these times, reservoir storage will be reduced and a greater amount of diversions will be required to refill the reservoir.

The least amount of diversions into storage will occur in dry years. In these dry years, the water rights for the project will be in-priority for a shorter duration and will not be able to divert water for any significant period of time. In the critically dry year of 2002, the amount of water diverted into storage was similar for all three demand scenarios and was substantially less than the amount of average diversions (Table 5.1).

We have assumed that the project will be operated as junior to all appropriate in stream flow water rights decreed to the Colorado Water Conservation Board. Accordingly, the project will not deplete stream flow of the Eagle River during periods of low stream flow.

Table 5.1
Annual Diversions Into Storage (1947 to 2003)
(Acre Feet)

	Scenario A	Scenario B	Scenario C
Eagle River			
Average	11,790	19,690	31,017
Critically Dry Year (2002)	10,413	10,413	13,734
Alkali Creek			
Average	3,356	5,176	5,470
Critically Dry Year (2002)	885	885	885
Total			
Average	15,146	24,866	36,487
Critically Dry Year (2002)	11,298	11,298	14,619

5.3 Change in Stream Flow

Existing and post-project hydrographs have been developed for the Eagle River near Gypsum, and for the Colorado River near Cameo (Attachment 5). Predicted changes in stream flow of the Eagle River and of the Colorado River near Cameo are illustrated for an average water year (1980). Simulated changes in discharge for all demand scenarios are presented. With Demand Scenario C, stream flow during the base flow period is very to similar to the simulated discharge associated with Scenario B. During the peak snowmelt runoff period, diversions into storage and releases from storage are greater in Scenario C in response to the operation of the reservoir for CFOPS objectives. Overall changes in stream flow will be somewhat less in Scenarios A and B.

We have assumed that any water released from Wolcott Reservoir for exchange purposes (to either Denver Water or the Homestake Project) will not result in an increase of stream flow at Cameo. Instead, we estimate that a like amount of water will be diverted by exchange at another location upstream of the Cameo site, and that stream flow at Cameo will not be changed by the exchanges. Releases by Denver Water for substitution purposes will not result in an overall annual depletion to the Colorado River at Cameo. However, the timing of releases for substitution purposes may not coincide with the exact timing of the upstream out-of-priority diversions that cause a demand for substitution releases. For purposes of this reconnaissance level assessment we have assumed that substitution releases occur concurrently with upstream out-of-priority diversions. Further, we have assumed that all water released for West Slope contract purposes will be fully consumed upstream of Cameo.

5.4 Recreation Pool Levels

The reservoir operations outlined above will provide substantial opportunities for flat water recreation. The reservoir will commonly fill to capacity in average and wetter than average years, and storage will remain at near-capacity levels through the summer months (Figures 5.1, 5.2 and 5.3). The reservoir may not fill to capacity in certain critical dry years; however substantial recreation pools will commonly remain. Reservoir storage was simulated to drop below 50 % of total storage capacity in less than 10 % of the study years. An additional assessment of potential recreation pool levels is provided in Section 8.5 of this report.

Section 6 – Engineering and Cost Evaluation

The engineering and cost evaluation outlined in this section was prepared by GEI Consultants as an update to cost estimates prepared in 2001 by Brown and Caldwell. The update is necessary because the amount of storage being considered at the Wolcott site has been reduced in comparison to the sizes considered by Brown and Caldwell. This evaluation also provides a brief evaluation of staging opportunities.

The project would consist of a diversion dam on the Eagle River and a delivery system to fill an off-channel reservoir at the Wolcott Reservoir site. The Wolcott Project would include the following major features:

- **Dam and Reservoir –** Dam and appurtenant structure layouts at the identified dam site would be configured for active reservoir storage capacities in the range of 45,000 to 95,000 acre feet. (Capacities up to 150,000 acre feet were considered).
- **River Diversion and Conveyance System –** These facilities would include: a diversion dam on the Eagle River; an intake tunnel or pipeline; a pumping station; and a pipeline from the pumping station to the Reservoir.
- **Highway Relocation –** State Highway 131 would need to be relocated around the Reservoir perimeter.
- **Ancillary Facilities –** These facilities would include access roads and potential energy recovery facilities.

6.1 Scope of Work

Several work tasks were completed for the cost estimate update for the Wolcott Project. In Task 1, prior investigations were reviewed to establish a database from which the cost estimates could be developed. A site visit to relate proposed structures to the site conditions and assess potential issues that may affect cost estimating for the facilities was completed in Task 2. Reconnaissance-level concepts and generalized plan layouts of main Project features on a USGS base map were completed in Task 3. Task 4 involved the preparation of reconnaissance-level cost estimates for the facilities identified in Task 3 and the development of cost curves for use in subsequent planning. The cost curves include both capital and operation and maintenance (O&M) costs. A Technical Memorandum that provides the foundation for this section was also developed.

This engineering assessment was performed at the reconnaissance level. The level of detail for reconnaissance-level studies of this type includes developing sufficient information to assess major differences among alternatives in terms of their cost and performance. The cost update was performed using available data from a variety of prior studies and GEI's experience on similar projects.

6.2 Key Considerations and Assumptions

6.2.1 Potential Dam Sites

Two sites for the dam were initially considered. The lower site is located on Alkali Creek approximately 4,000 feet upstream from the Eagle River at the site identified by Parsons Brinkerhoff for Denver Water in 1974 (Figure 6.1). The upper site is located approximately 7,000 feet upstream along Alkali Creek from the Eagle River.

6.2.2 Storage Allocations

GEI made the following key assumptions to develop cost estimates for the Wolcott Project:

(1) Active storage volumes of 50,000, 100,000 and 150,000 acre feet would be developed at the Lower Site. Active storage volumes of 50,000 and 80,000 acre feet would be developed at the Upper Site, as indicated in Table 6.1. The elevation-storage relationships are shown on Figure 6.2. (Note that elevation-capacity curves developed by GEI from USGS 7.5-minute mapping were used for both sites to estimate storage volumes.

Table 6.1
Initial Wolcott Reservoir Characteristics

Site	Active Reservoir Capacity (ac-ft)	Normal Surface Area (acres)	Minimum Pool Elevation (feet)	Normal Pool Elevation (feet)	Dam Crest Elevation (feet)	Maximum Dam Height (feet)
Upper Site	50,000	917	7,208	7,289	7,300	210
	80,000	1,118	7,208	7,320	7,331	241
Lower Site	50,000	995	7,183	7,264	7,285	225
	100,000	1,360	7,183	7,307	7,324	264
	150,000	1,635	7,183	7,340	7,354	294

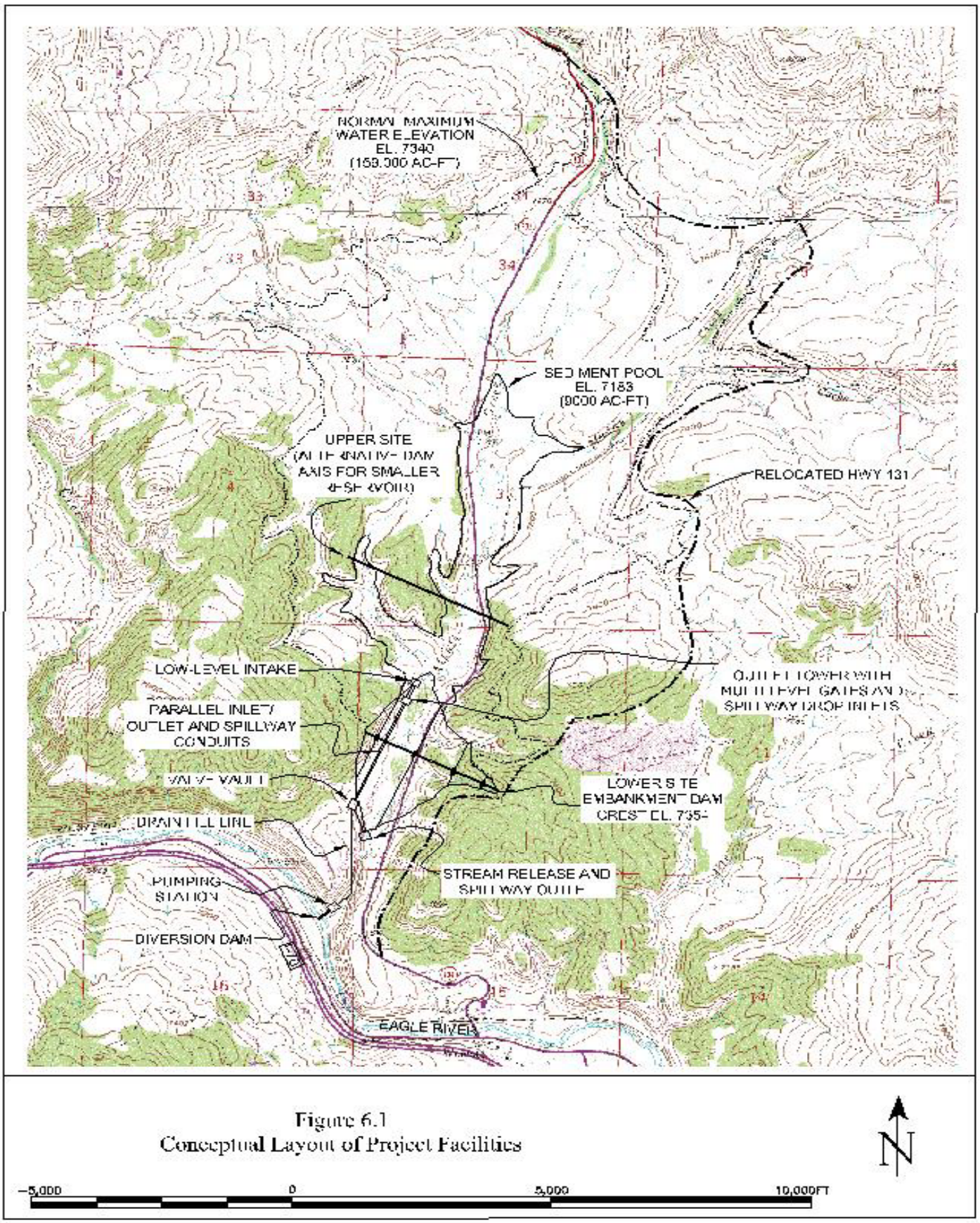
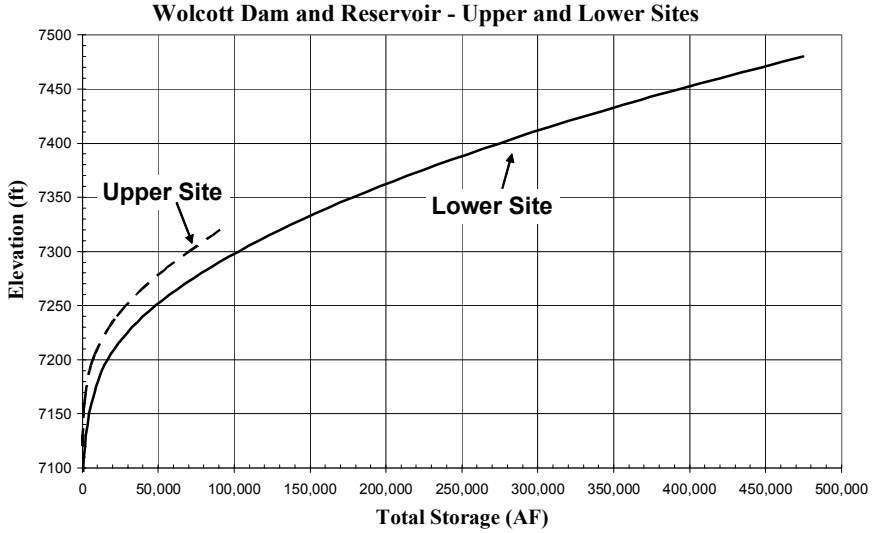


Figure 6.1
Conceptual Layout of Project Facilities

(2) An allowance for a conservation pool for sediment storage would be provided, based on a gross assumption of 2 acre feet per square mile per year over a 100-year period. This amounts to approximately 10,000 acre feet of sediment accumulation from the 47-square-mile Alkali Creek watershed.

(3) Flood surcharge storage at the Lower Site and the Upper Site would be 20,000 acre feet and 10,000 acre feet, respectively, based on the design flood assumptions described below. Flood surcharge would be provided on top of the normal reservoir pool, and represents space for temporary storage of flood volumes until they can be released through a small service spillway.

Figure 6.2
Elevation-Capacity Curves
Wolcott Dam and Reservoir - Upper and Lower Sites



6.2.3 Design Flood and Spillways

The following assumptions apply to reservoir sizing for the inflow design flood:

(1) Design flood estimate based on the HMR-49 probable maximum precipitation (PMP) depths for the greatest month (September) assuming no contribution from snowmelt.

(2) Runoff into reservoir was based on a basin area (Lower Site) of 47 mi^2 assuming that 75 percent of precipitation is runoff. (This is consistent with the 77 percent runoff ratio in the 1974 Parsons Brinkerhoff study).

(3) One-half of the 24-hour PMP runoff would be stored in the Upper Site reservoir during routing of the PMP runoff. Estimated 24-hour runoff is 7.8 inches on the watershed, or roughly 20,000 acre feet. One-half of the PMP runoff volume is 10,000 acre feet. An abutment spillway channel would be provided. Based on residual freeboard of 1 foot during the PMP event, we estimated the normal pool elevation at the Upper Site and assumed that a spillway would be provided to discharge the inflow design flood peak estimated by Parsons Brinkerhoff in 1974, approximately 22,000 cfs, which is the peak from 4 inches of runoff on the watershed. The emergency spillway at the Upper Site would be a broad-crested weir (assume C=3.0).

(4) The entire 24-hour PMF volume (20,000 acre feet) would be stored in the Lower Site reservoir, in the reservoir free board provided between the normal reservoir pool and the minimum free board for the PMP event. A small overflow service spillway would be provided in the intake tower.

6.2.4 Embankment Dam

Foundation conditions at the two dam sites indicate that an embankment dam with relatively flat upstream and downstream slopes will be the preferred dam configuration. The 1974 Parsons Brinkerhoff study indicated that upstream and downstream slopes would be 4(H):1(V), but that berms would be provided for stability. Based on the Parsons Brinkerhoff study, GEI made the following assumptions:

(1) Estimate quantities of embankment fill based on effective slopes of 6(H):1(V) downstream and 6(H):1(V) upstream. (The 6:1 slopes are about the same as the Parsons Brinkerhoff configuration with the berms).

(2) To account for the costs of foundation work, we increased the embankment quantities estimated using USGS mapping by an allowance of 20 percent.

(3) Zoning of the dam was not considered at this level of study.

(4) Embankment dam costs were estimated from experience on recent dam projects, based on the total estimated quantity of embankment material (Attachment 6).

6.2.5 Drain/Fill and Outlet Facilities

Wolcott Dam would be an off-channel facility. The primary source of inflow to the reservoir will be by in-priority pumping from a diversion facility on the Eagle River. Local runoff from Alkali Creek will also be captured and stored while in priority. Releases from storage would be made to meet a variety of demands. The amounts of these demands will vary depending on ultimate use of the water, reservoir size, and diversion capacity. Key assumptions for the drain/fill and outlet facilities are summarized below:

(1) A multi-level intake tower would be provided, with access to the top of the tower via a bridge from the dam crest. The tower would allow the release of water from variable elevations within the reservoir. The tower would range in height from approximately 140 to 210 feet at the Lower Site.

(2) Two conduits would be provided within the dam at the Lower Site – one for normal filling and draining of the reservoir and for emergency draw down and the second for service spillway releases. At the Upper Site only one conduit would be required, because the service spillway would be an overflow weir in the right abutment.

(3) The reservoir would be filled by pumping from the Eagle River at capacities ranging from 50 to 250 cfs through the drain/fill pipeline.

(4) The diversion dam on the Eagle River would be a low-head structure with gates or rubber dam that could be lowered to pass flood flows, to facilitate recreational use and to provide fish migration.

(5) The drain/fill pipeline would be sized for maximum velocity of 10 fps, except for releases to meet CFOPS demands. Releases for normal operations through the drain/fill line would be 400 cfs. Releases for CFOPS demands (Scenario C) would increase the capacity to 1,000 cfs. While the release could be lower for Scenarios A and B, it was

assumed the same capacity would be provided for all reservoir sizes. Therefore, the same size drain/fill conduit was assumed for each alternative (87-inch diameter at 10 fps). Assuming that for short time periods, the velocity could be increased safely to 24 fps in the 87-inch conduit. Alternatively, a portion of the CFOPS releases could be made via Alkali Creek through the low-level outlet.

(6) The emergency draw down rate through the outlet works would be about 800 cfs for the largest size reservoir, and 600 cfs for the smallest size. The release pipe for emergency would branch from the drain/fill line near the toe of the dam and would discharge through a fixed-cone valve into Alkali Creek.

(7) The service spillway flows at the Lower Site would be released through a 96-inch diameter pipeline to a stilling basin discharging to Alkali Creek a safe distance downstream of the dam.

(8) Pipe friction losses for pumping energy determinations are based on Hazen-Williams C of 120 and assuming that all minor losses are covered by a provision of 20 percent of the estimated friction loss.

(9) Pumping station capacity is based on pump/motor efficiency of 85 percent.

6.2.6 Highway Relocation

The Highway 131 realignment was taken from the 1974 Parsons Brinkerhoff study with adjustment in length based on the size of the reservoir. The estimated cost of the highway realignment is included in the cost estimates outlined below.

6.3 Cost Estimates

Cost estimates were prepared by GEI for the dam and appurtenance structures/facilities, including the intake tower, stream release, drain and fill facilities, and highway relocation, including the diversion dam, pumping station and pipeline from the Eagle River to Wolcott Dam at the Lower Site. Cost estimates are in 2004 dollars. After reviewing the embankment quantities for developing 50,000 and 80,000 acre foot reservoirs at the Upper Site, we concluded that developing storage at the Upper Site would not be attractive in comparison to

the Lower Site. In addition, the drain/fill pipeline, pumping station, and pumping energy costs would be greater for a development at the Upper Site. Therefore, cost estimates were prepared for the Lower Site only.

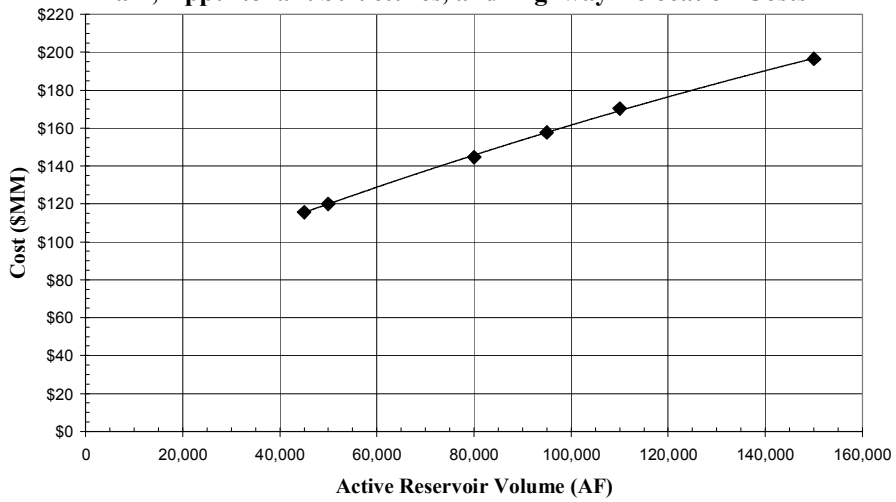
6.3.1 Dam, Appurtenances, and Highway Relocation

Pertinent data and construction cost estimates for Wolcott Dam (Lower Site) are summarized in Table 6.2 and are depicted graphically on Figure 6.3. The dam costs in Table 6.2 include the embankment, multi-level tower and spillway, and the outlet works, but they exclude reservoir drain/fill facilities below the dam (which are estimated separately), and land acquisition and right-of-way costs. Cost estimates are based on GEI experience on similar projects, published information on dam construction in Colorado, and professional judgment.

Table 6.2
Initial Construction Cost Estimates – Wolcott Dam
(Dam, Appurtenances, and Highway Relocation)

Active Reservoir Volume (ac-ft)	Max. Dam Height (feet)	Dam Volume (cy)	Highway 131 Relocation (miles)	Construction Cost ($MM)	Storage Cost ($/ac-ft)
50,000	225	15,000,000	5.0	120	2403
100,000	264	23,100,000	5.2	161	1615
150,000	294	32,000,000	5.3	197	1310

Figure 6.3
Wolcott Reservoir
Dam, Appurtenant Structures, and Highway Relocation Costs



6.3.2 Drain and Fill Facilities

Pertinent data and construction cost estimates for the Wolcott Dam drain and fill facilities are provided in Table 6.3 and are depicted graphically on Figure 6.4.

The drain and fill costs in Table 6.3 include the diversion dam, pumping station and pipeline but do not include land acquisition and right-of-way costs. Cost estimates are based on GEI experience on similar projects, published information on similar facilities in Colorado, and professional judgment.

Pumping costs will vary depending on the reservoir size and operational scenarios. Pumping heads are expected to vary from 350 feet for the 50,000 acre foot reservoir, to 400 feet for the 100,000 acre foot reservoir, and 430 feet for the 150,000 acre foot reservoir. At $0.08/kWh, the pumping costs are expected to be $34, $39, and $42 per acre foot for the 50,000, 100,000, and 150,000 acre foot reservoirs, respectively.

Table 6.3
Initial Construction Cost Estimates – Wolcott Dam
(Drain and Fill Facilities)

Active Reservoir Volume (ac-ft)	Delivery Capacity (cfs)	Nominal Pumping Head (feet)	Pump Capacity (HP)	Construction Cost ($MM)
50,000	50	340	2,290	14.8
	150	340	6950	19.4
	250	350	11,760	22.4
100,000	100	390	5,190	18.0
	150	390	7,810	20.1
	250	400	13,200	23.4
150,000	150	420	8,470	20.4
	200	420	11,360	22.3
	250	430	14,310	24.0

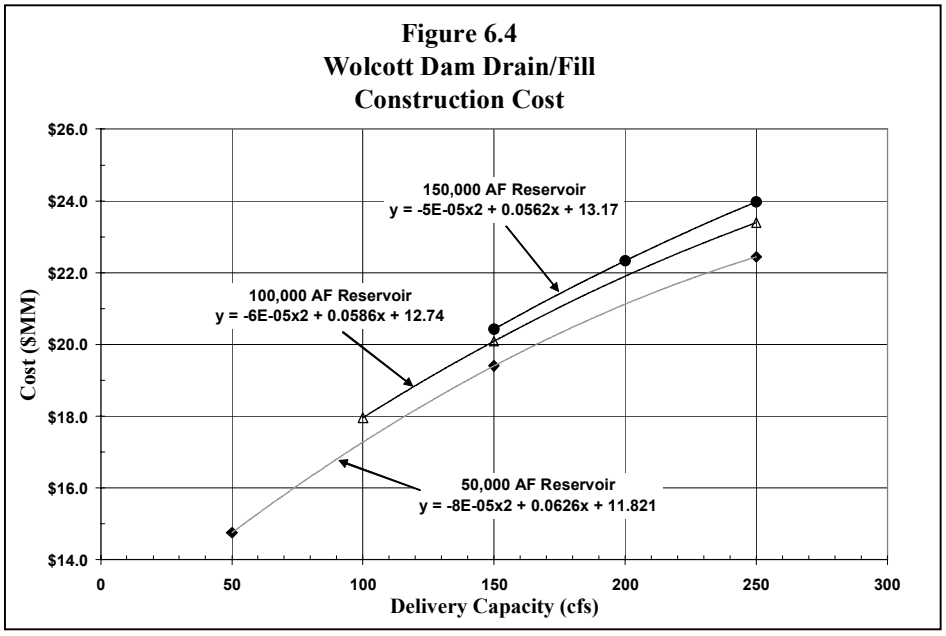


Figure 6.4
Wolcott Dam Drain/Fill
Construction Cost

6.4 Project Costs by Demand Scenario

The cost estimates previously described were considered in conjunction with reservoir simulation model results, to specifically identify reservoir sizes and diversion pumping station capacity for each demand scenario. Dam and reservoir specifications at the Lower Site are outlined in Table 6.4.

Table 6.4
Reservoir Characteristics

	Active Reservoir Capacity (ac-ft)	Normal Surface Area (acres)	Minimum Pool Elevation (feet)	Normal Pool Elevation (feet)	Dam Crest Elevation (feet)	Maximum Dam Height (feet)
Scenario A	45,000	962	7,183	7,259	7,280	220
Scenario B	80,000	1,225	7,183	7,291	7,308	248
Scenario C	95,000	1,428	7,183	7,303	7,320	260

Construction quantity and cost estimates were developed using the same costing models described previously. Cost estimates for the three demand and storage scenarios are presented in Table 6.5.

Table 6.5
Construction Cost Estimates
(Dam, Appurtenances, and Highway Relocation)

	Active Reservoir Volume (ac-ft)	Maximum Dam Height (feet)	Dam Volume (cy)	Highway 131 Relocation (miles)	Construction Cost ($MM)	Storage Cost ($/ac-ft)
Scenario A	45,000	220	14,300,000	5	116	2,572
Scenario B	80,000	248	20,500,000	5.1	145	1,808
Scenario C	95,000	260	22,500,000	5.2	158	1,548

Drain and fill facility cost estimates were developed for the reconfigured delivery and storage capacities for each demand scenario using the methods described previously. These construction costs are presented in Table 6.6.

Table 6.6
Construction Cost Estimates

(Drain And Fill Facilities)

	Active Reservoir Volume (ar-ft)	Delivery Capacity (cfs)	Nominal Pumping Head (feet)	Pump Capacity (HP)	Construction Cost ($MM)	Pumping Energy Cost[1] ($/ac-ft)
Scenario A	45,000	150	340	6,860	19.4	33
Scenario B	80,000	150	370	7,490	19.8	36
Scenario C	95,000	200	390	10,380	21.8	37

[1]At $0.08 per kWh

Total construction costs for the Wolcott Project are expected to range from $135 to $180 million, as indicated in Table 6.7. Examples of cost estimating procedures are presented in Attachment 6.

Table 6.7
Summary of Reservoir and Conveyance Capacities and Construction Costs

	Total Reservoir Volume (ac-ft)	Active Reservoir Volume (ac-ft)	Average Reservoir Release (ac-ft/yr)	Average Pumping Volume (ac-ft/yr)	Construction Cost ($MM)		
					Dam and Related Facilities	Pumping Plant & Diversion Facilities	Total
Scenario A	55,000	45,000	13,450	11,790	116	19.4	135.4
Scenario B	90,000	80,000	22,790	19,690	145	19.8	164.8
Scenario C	105,000	95,000	34,670	31,017	158	21.8	179.8

Present worth costs for each acre foot of dry year yield are summarized in (Table 6.8). For purposes of this study, dry year yield is equal to the simulated reservoir deliveries in the critically dry year of 2002. The cost of dry year yield, including the present worth of pumping energy, is estimated to range from $6,800 per acre foot for Scenario A to about $4,330 per acre foot for Scenario C. As simulated in this study, Scenario C provides substantial reservoir releases for environmental purposes in about one half of the study years. Supplemental environmental releases have not been simulated to occur in the critically dry year of 2002. If environmental releases are supplied from the reservoir in critically dry years such as 2002, the cost of dry year yield will decrease from the estimates in table 6.8. Also, dry year reservoir storage levels will be lower than illustrated in Figure 5.3.

Table 6.8
Costs of Dry Year (2002) Yield

	Construction Cost ($MM)	Present Worth of Energy Cost[1] ($MM)	Total Cost ($MM)	Dry Year (2002) Yield (acre feet)	Cost of Dry Year Yield ($ per acre foot)
Scenario A	135.4	8.4	143.8	21,140	6,800
Scenario B	164.8	15.3	180.1	40,250	4,470
Scenario C	179.8	24.7	204.5	47,200	4,330

[1]Interest rate of 4% and period of 50 years.

6.5 Staged Development Opportunities

Storage potential at the Lower Site has been evaluated up to 350,000 acre feet (Parsons Brinkerhoff, 1974) total reservoir capacity. Any of the reservoir sizes considered for the current study, could be considered as an initial stage of an "ultimate" development. If a future

enlargement of the reservoir appears to be a likely scenario, it would be prudent to incorporate this consideration into design of the initial stage. For the dam, it would be appropriate to configure the upstream shell, impervious zone, and filter/drainage zones and the foundation treatment and grouting provisions for the ultimate height dam. The conduits beneath the dam should be sized and designed for the ultimate development. While this approach might add 10 to 20 percent to the cost of the first stage, the overall cost is likely to be lower if these provisions are made initially rather than incorporated later. The pumping station and the drain/fill pipeline downstream of the dam could be sized for the initial development and expanded and paralleled later; however, there would be some overall cost advantages if the pipeline were sized for the ultimate development.

6.6 Alternative Tunnel from Piney River to Wolcott Reservoir

An alternate source of water supply for the reservoir is a gravity tunnel system from the Piney River, about six miles northeast of the reservoir site. This alternative would replace the pumping station and pipeline from the Eagle River described previously. Based on regional geologic mapping, it appears that the Piney to Wolcott tunnel would be primarily in the Morrison Formation. This formation consists of interbedded sandstone, claystone and limestone.

A feasibility level cost estimate has been developed for the tunnel alternative. This estimate is subject to many uncertainties related to geology, groundwater conditions, tunneling methods, support requirements, and numerous other factors. The cost estimate is based on the following considerations at this early reconnaissance stage:

- The tunnel from Piney River to Wolcott Reservoir would be approximately 6.1 miles long.
- The elevation difference between the Piney River Diversion (El. 7440) and the highest normal pool of Wolcott Reservoir (El. 7320 for the 95,000 acre-foot active capacity reservoir) would be 80 feet. The tunnel would probably daylight at El. 7400 and the average slope will be 0.12 percent.
- Diversion and tunnel discharge capacity would be 200 cfs.
- Based on the above factors, the conveyance line would need to have a diameter of at least 6.5 feet.

- The tunnel could be advanced by drill and blast methods or by tunnel boring machine (TBM). Construction with a TBM is the most likely construction method.
- The tunnel most likely would have a diameter of at least 10 feet if a TBM were used. If the tunnel were sized to accommodate a 6.5-foot-diameter steel pipe, it would need to be larger in diameter. Most likely, the tunnel would be constructed to a diameter of 10 feet and lined with concrete (conventional or pre-cast lining sections) to provide a finished diameter of approximately 8 feet. The tunnel would not flow full at 200 cfs.
- While Scenarios A and B may require less than 200 cfs of diversion and tunnel capacity, there would be no significant reduction in cost for smaller water deliveries because the tunnel size will likely be dictated by construction rather than hydraulic considerations. The minimum tunnel bore (unfinished diameter) is probably 10 feet.
- The diversion dam on Piney River would have a similar cost to that on the Eagle River.
- The discharge into Wolcott Reservoir (in the Muddy Creek arm of the reservoir) would be a concrete terminal structure that would dissipate energy. Stabilization of Muddy Creek might be required to avoid erosion.
- Intermediate shafts likely would be needed to provide adequate ventilation. Two vertical shafts are assumed to be required.

We estimate that the approximately 6-mile-long tunnel would have a construction cost ranging from $68 to $88 million, including the upstream and downstream portals, access/ventilation shafts, diversion dam, and outlet facilities, as well as contingencies, engineering and administration. The cost estimate is based on our experience with the two tunnels totaling 13,500 feet recently completed for the Plateau Creek Pipeline Replacement Project (Ute Water Conservancy District) supplemented by published information from various sources. The average cost of tunnel construction is expected to range from $1500 per foot to $2000 per foot (base construction without contingencies, engineering, and administration), based on a nominal 10-foot-diameter tunnel, and lined diameter of approximately 8 feet. The per-foot costs include portal construction and concrete lining, but not the costs of the diversion dam, shafts, and outlet facilities.

The present worth of pumping and pipeline facilities, and pumping energy, for the Eagle River to Wolcott pipeline system is estimated to be $46.5 million ($21.8 million for construction; $24.7 million energy cost). These preliminary cost estimates reflect that the cost of the Eagle River pumping alterative may be one-half to two-thirds of the cost of a Piney River gravity tunnel.

Section 7 - Water Quality

Wolcott Reservoir will positively impact water quality of the Eagle River and the Colorado River during most periods. Based on a reconnaissance level assessment, we conclude that the reservoir will typically improve the quality of the Eagle River from Wolcott to Dotsero. The reservoir will reduce sediment loading, decrease water temperature, and reduce the concentration of dissolved solids in the Eagle River. On the Colorado River, operations of the reservoir will likely decrease dissolved solids and improve water quality during certain low flow periods when water is released for fish habitat in the 15-Mile Reach.

The reservoir may also have potential negative impacts depending upon the facility's operation and other factors discussed below. Operation of the reservoir may increase dissolved solids in the Colorado River at those times of the year when reservoir releases are used to facilitate upstream water exchanges or substitutions. It is likely that this impact can be mitigated through the management of diversions, and with the use of a multi-level outlet facility.

The reservoir's affect on water quality may be a key issue related to the feasibility of the project. This report particularly focuses on the influence of reservoir releases on dissolved solids and selenium concentrations in the Colorado River near Grand Junction.

7.1 Eagle River

The quality of the lower Eagle River is commonly very good. Water quality typically is better than water quality standards established by the Water Quality Control Commission to protect aquatic life and other uses. Important water quality issues associated with the lower Eagle River primarily relate to sedimentation and temperature.

7.1.1 Sedimentation

Local summer thunderstorm events often result in very high sediment loads in the lower Eagle River. The primary watersheds that contribute to the elevated sediment concentrations are Milk Creek, Alkali Creek and Ute Creek. Each of these watersheds is located north of the Eagle River and is primarily underlain by Pierre Shale, a highly erosive fine-grained shale formation. We estimate that the largest contributor of sediment loading is the Milk Creek

watershed, with substantial sediment loading also occurring from Alkali Creek. Sediment contributions from Ute Creek are likely smaller, in response to the reduced size of this watershed.

These watersheds contribute very high concentrations of suspended sediment to the lower Eagle River. The high sediment loads reduce water quality and affect aquatic habitat, fishing, and recreation use of the river not only during the thunderstorm events, but also following the storms. The sediment is typically introduced to the Eagle River during July and August storm events when stream flow of the Eagle River is fairly low. In these low flow conditions, a large amount of the silts and sediment may settle and be deposited on the bed of the Eagle River. The deposition of the fine-grained material can affect substrate conditions and degrade aquatic habitat of the river until the following snowmelt period when stream flow of the Eagle River is high enough to scour the deposited fine material.

Wolcott Reservoir will impound the Alkali Creek watershed. Sediment loads from this watershed will be captured by the reservoir. Given the relatively large size of the impoundment, the reservoir will be very effective in reducing sediment loads from Alkali Creek. Accordingly, it is reasonable to expect that Wolcott Reservoir may reduce sediment loading to the Eagle River during summer thunderstorms by one-third or more. The reduction in sediment contributions will improve water quality and aquatic habitat of the lower Eagle River.

7.1.2 Temperature

Water temperatures of the lower Eagle River have occasionally exceeded water quality standards implemented to protect aquatic life. The temperature standards have primarily been exceeded during portions of the late summer months of drier than average years, although high temperatures can also occur in other years.

The operation of Wolcott Reservoir will substantially decrease water temperature of the Eagle River below Wolcott. Reservoir releases will increase stream flow and water velocity during the late summer months, which will in turn reduce water temperature. More importantly, reservoir releases will be considerably colder than ambient temperatures of the Eagle River during the summer months. We believe that the operation of the reservoir will

eliminate, or substantially reduce, the periods of times that water temperature exceeds aquatic life standards downstream of the reservoir.

7.1.3 Dissolved Solids

On the Eagle River downstream of the reservoir, concentrations of dissolved solids and major ions will be decreased during low flow periods. The majority of the water stored in the reservoir will be high quality snowmelt runoff from the Eagle River. Dissolved solids in the stored water are less than the dissolved solids concentrations that occur in the river during low flow periods when reservoir releases will occur.

A reconnaissance level assessment of water quality of the Eagle River and of Alkali Creek has been completed for each demand scenario. Local stream flow and water quality data were used to develop discharge vs. dissolved solids relationships for the Eagle River and Alkali Creek. A mass-balance approach was applied to estimate water quality that may occur within the reservoir. Based on this assessment, we conclude that the concentrations of dissolved solids in Wolcott Reservoir may vary from approximately 300 milligrams per liter (mg/l) in Scenario A, to about 260 mg/l in Scenario C. Dissolved solids within the reservoir may be lowest in the highest demand scenario (Scenario C), because more high quality Eagle River water will be stored in relation to the poorer quality Alkali Creek water. These estimates of dissolved solids assume total mixing of inflow within the reservoir.

During the base flow period when most of the reservoir releases will occur, historical dissolved solids concentrations of the Eagle River near Gypsum have typically ranged from about 500 to 1,000 mg/l. Reservoir releases will have lower dissolved solids than ambient Eagle River concentrations at this time. Accordingly, reservoir releases will decrease dissolved solids concentrations in the Eagle River. While dissolved solids concentrations may decrease, the change may not represent an important change in the water quality of the lower Eagle River. Dissolved concentrations of the river will be relatively low both with and without the reservoir operation.

7.2 Colorado River

Operation of the reservoir may also change water quality of the Colorado River. Important water quality issues are related to potential changes in dissolved solids and to selenium concentrations of the lower Colorado River near Grand Junction.

7.2.1 Dissolved Solids

It is possible that operation of the reservoir may either increase or decrease dissolved solids in the Colorado River, depending upon the timing and amount of releases from the facility. The relative change in dissolved solids within the Colorado River will be small; concentrations will not likely change by more than two or three percent.

Reservoir releases for fish habitat (10,825 water) will improve chemical water quality and decrease dissolved solids in the Grand Valley. The reduction in dissolved solids will result from the release of water that is much lower in dissolved solids (approximately 260 to 300 mg/l) than the ambient quality of the Colorado River during the late summer months (approximately 800 to 1000 mg/l).

The affect of other reservoir releases to the water quality of the Colorado River is more complex. Wolcott Reservoir releases that are made to facilitate upstream exchanges or substitutions in the early summer may decrease the quality of water of the lower Colorado River. The decrease would result when reservoir releases are of poorer quality than the water that is diverted upstream by substitution and exchange. However, to the extent that Wolcott Reservoir releases are substituted for releases from other reservoirs with poorer quality, water quality in the Colorado River could actually improve.

We have completed a reconnaissance level assessment of the potential changes in dissolved solids that may result from operation of the reservoir in a dry year. The assessment utilizes a mass-balance approach to evaluate potential changes in dissolved solids of the Colorado River near Cameo. For purposes of this initial assessment, we have assumed that Wolcott Reservoir releases will have dissolved solids of 300 mg/l and that water diverted upstream by exchange will range in concentration from 75 to 100 mg/l.

Results of this assessment reflect that reservoir operation could increase dissolved solids concentrations during the early or mid-summer months (commonly July or early August), when reservoir releases are made for exchange purposes. This operation could result in a net increase in dissolved solids that may range from 0% to 3% in the Colorado River near Cameo. This potential increase would not occur at the time of year when dissolved solids are at their highest level, but instead, would occur in the mid-summer months when dissolved solids concentrations are reduced.

In the late summer months when stream flow is at it's lowest level (typically late August through October), releases of water for environmental purposes are anticipated. As outlined above, these releases will decrease dissolved solids concentrations of the Colorado River and improve water quality. The mass-balance assessment reflects that the releases of water for environmental purposes may generally decrease dissolved solids concentrations by 2% to 4%. This improvement in water quality will occur at that time of the irrigation season when dissolved solids concentrations in the Colorado River are often at their highest.

The actual affect of the reservoir on dissolved solids is complex and will vary in response to not only the operation of the reservoir, but will also be influenced by the operation of other facilities in the basin. While it is beyond the scope of this study to complete a detailed assessment of this issue, we believe that the conceptual changes in dissolved solids discussed above are representative of actual changes that are likely to occur.

7.2.2 Selenium

Selenium is a water quality parameter of special concern, particularly in the lower Colorado River. Elevated selenium concentrations can be toxic to fish and aquatic life. Certain shale formations, such as the Pierre shale that underlies the Alkali Creek watershed and the Wolcott Reservoir site, are known sources of selenium. Accordingly, it will be important to understand the influence of the reservoir upon selenium concentrations.

Reported dissolved selenium concentrations of the Colorado River near Cameo have recently ranged from approximately 0.3 micrograms per liter (ug/l) to 0.7 ug/l (Friedel, 2004). As with many other trace metals, the highest selenium concentrations generally occur at lower rates of stream flow. The reported ambient selenium concentrations are substantially lower

than applicable water quality standards. Chronic and acute selenium water quality standards are 4.6 ug/l and 18.4 ug/l, respectively.

The U.S. Geological Survey water quality database for the Eagle River watershed was reviewed to identify ambient selenium concentrations in the Eagle River and in Alkali Creek. Available information suggests that selenium concentrations in the Eagle River are generally lower than concentrations within the Colorado River in the Grand Valley area. Adequate data is not available to characterize selenium concentrations in Alkali Creek. This matter needs further investigation.

Most of the water stored in Wolcott Reservoir will originate from the Eagle River (about 80% of total inflow) and will be of high quality. When Eagle River water is mixed with the poorer quality water of Alkali Creek, selenium concentrations may increase above those found in the Eagle River. Given the relatively small amount of inflow from Alkali Creek, we believe it is likely that selenium within the reservoir will remain at concentrations that are lower than applicable water quality standards. In this event, reservoir releases may not have a material impact on selenium levels in the Colorado River.

Additional water quality sampling is required to determine the amount and variability of actual selenium concentrations in Alkali Creek, and to confirm the above hypothesis. Until this data is available, it will be difficult to complete a comprehensive assessment of the influence of the reservoir on selenium concentrations.

A secondary issue that may be important relates to potential leaching of selenium into the reservoir from local soils and geologic material. A detailed study that evaluates reservoir operation and the residence time of stored water, along with leaching characteristics of Pierre shale, may be appropriate. It should be noted that both Green Mountain Reservoir and Wolford Mountain Reservoir are situated on similar geologic material and may be subject to this same issue.

If selenium concentrations in the reservoir are determined to be an issue, the operation of a multi-level intake tower may mitigate this concern. Selenium may be subject to reduction within the reservoir and could concentrate within the lower portions of the reservoir. Multi level outlet facilities could be used to ensure that water with increased selenium concentrations is not released during critical periods of the year.

Section 8 – Other Environmental Issues

The proposed Wolcott Reservoir will affect environmental conditions both locally and downstream of the reservoir. A detailed evaluation of the environmental issues associated with the facility is not within the scope of this reconnaissance level assessment. In order to fully understand environmental issues associated with the reservoir, many site specific studies may be required. However, primary environmental issues that are known to exist at this time are summarized and discussed in this section, along with potential mitigation opportunities.

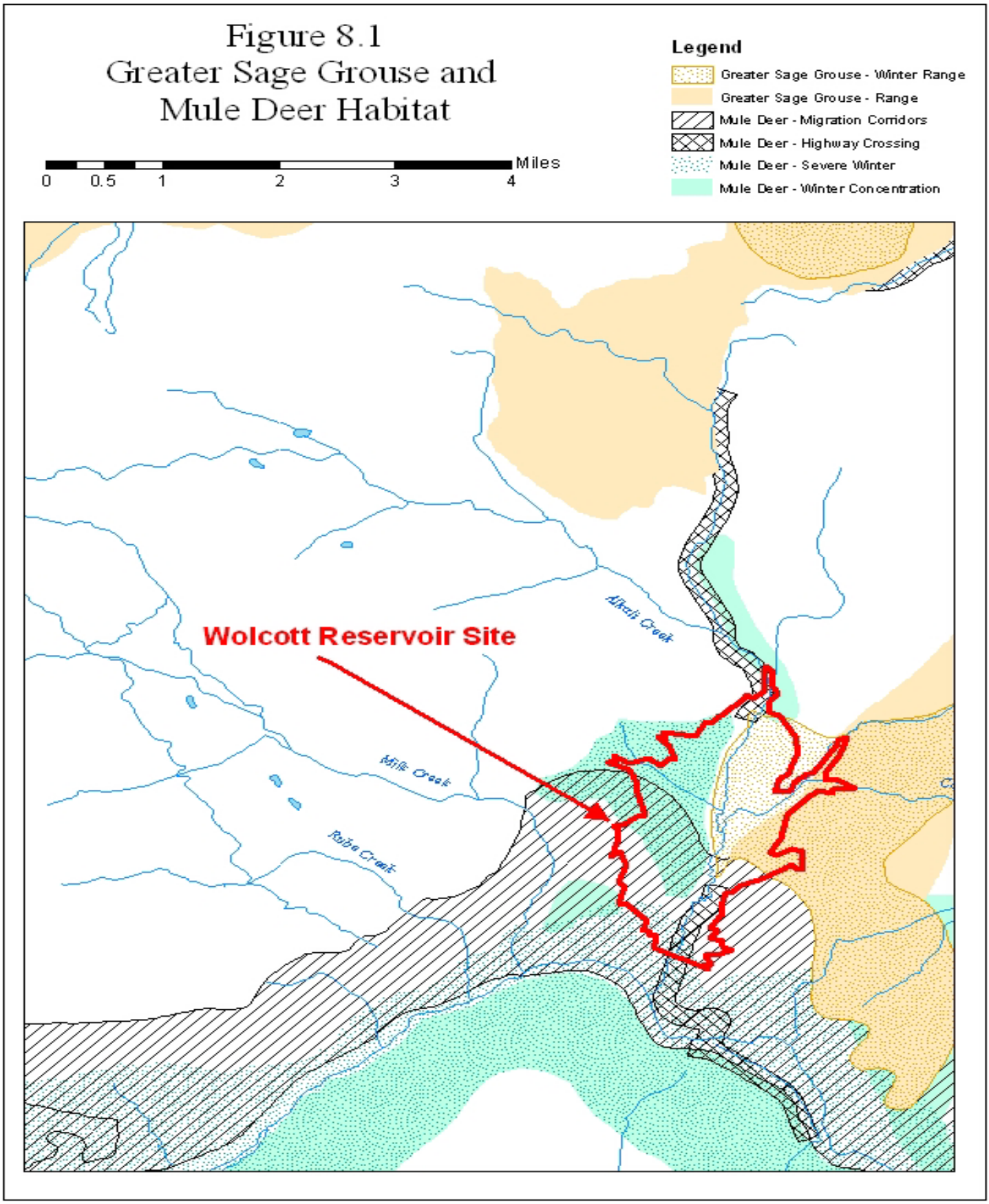
Based on our initial review of environmental issues, we conclude that each of three alternatives assessed herein will have relatively similar environmental consequences. The impact of a smaller reservoir will not differ greatly from the impact of a larger facility. We also believe that environmental issues associated with the reservoir can be largely mitigated. As outlined below, the greater sage grouse is currently under evaluation to be listed as a threatened and endangered species and potentially raises the most important mitigation issue.

8.1 Greater Sage Grouse

The bottomlands of Alkali Creek at the proposed Wolcott Reservoir site have been identified as a sage grouse nesting area by the Colorado Division of Wildlife (DOW) (Figure 8.1). The greater sage grouse has currently been identified as a species of special concern, although a more protective status may soon be given to the bird (Toolen, 2004). The status of the greater sage grouse may impact permitting and construction of the reservoir.

Very little suitable greater sage grouse habitat is left in Colorado; recent estimates indicate that populations have declined approximately 86 percent from historic levels. Eagle County has been identified as an area of concern, with a significant decline in sage grouse populations in the past 20 years. In December 2003, a petition was filed with the U.S. Fish and Wildlife Service to propose the listing of the greater sage grouse as a "threatened and endangered species". Listing would provide the greater sage grouse and related habitat with greater Federal protection.

Figure 8.1
Greater Sage Grouse and Mule Deer Habitat



In order to permit the proposed Wolcott Reservoir, the effects of construction and operation of the reservoir on the greater sage grouse must be evaluated. The greatest impact is likely associated with the loss of critical habitat, leks or nesting areas along riparian corridors. Secondary impacts from increased development and activity within close proximity to the reservoir may also create a loss of habitat. The extent of mitigation required to permit the reservoir will be dependent on whether the greater sage grouse is listed as a threatened and endangered species.

The decision to place the greater sage grouse on the threatened and endangered species list will be made by the US Fish and Wildlife Service (Service). The December 2003 petition to have the greater sage grouse listed was followed by a 90-day study as required by the Endangered Species Act. Results from the 90-day study were released on April 15, 2004. Through this study the Service has determined that substantial biological information exists to warrant a more in-depth examination of the status of the greater sage grouse.

Since the findings of the 90-day study have been determined to be substantial, the Service is now conducting an additional, more detailed study of the issue. This study will be completed within 9 months. Results of this additional study will result in one of the following categories with regard to the threatened and endangered species list:

1) listing is not warranted;
2) listing is warranted but precluded by higher listing actions; or
3) listing is warranted and published with proposed listing rule.

If the results are not warranted, no further studies will be completed by federal agencies at this time. If the results are warranted but precluded by higher listing actions, then there will not be any legal regulations protecting the greater sage grouse, but it will continue to be a priority for the DOW to protect and maintain sage grouse habitat. If the listing is found to be warranted and published with proposed listing rule, then the species will be listed as a candidate for the threatened and endangered species. The species will continue to be studied for approximately one year time prior to it being officially listed as a threatened and endangered species. The Service will publish a proposal to the list, and solicit independent scientific peer review of the proposal, seek input from the public and consider the input before a final decision is made. During these stages of the investigation it is suggested that Wolcott Reservoir project proponents become involved with the review process.

If the greater sage grouse becomes a candidate for the threatened and endangered species list, then more substantial mitigation and permitting will be necessary for the proposed Wolcott Reservoir. This listing may not be a fatal flaw to the proposed reservoir at Wolcott, but would make permitting more difficult. Since the location of the proposed reservoir has a drier environment than is typically ideal for greater sage grouse, it may be easier to mitigate proximal locations. Proactive mitigation should be considered in order for permits to be approved.

Suggested mitigation efforts include:

- Obtain protective land easements elsewhere on suitable/critical habitat
- Vegetation mitigation
    - Clearing of pinion/juniper forests that have encroached on historically sage brush habitat
    - Replanting sage brush to create suitable/critical habitat
    - Protect riparian areas or "wet meadows" to promote broodering
    - Increase under-storage of grasses and forbes, for food and nesting material
- Prevent or minimize infrastructure within proximity to the reservoir

8.2 Terrestrial Animals

In addition to the greater sage grouse, other key terrestrial animals occupy the Wolcott Reservoir site (Wescoatt, 2004). Mule deer and elk are among the key terrestrial species that should be considered (Table 8.1).

The proposed Wolcott Reservoir site is classified as "severe winter range" for mule deer (Figure 8.1). A severe winter range is habitat that can be occupied during extreme winter conditions when other winter range may not be accessible (typically the 2 worst years out of 10 year cycles). Winter range for elk occurs in the vicinity of the reservoir, although actual reservoir facilities would not occupy any winter elk habitat.

Migration corridors facilitate the movement of mule deer and elk from winter to summer ranges. Corridors are often disrupted by the construction of roads. Since State Highway 131 is already present in the area, reservoir construction and the relocation of the highway may not substantially degrade current migration habits.

Table 8.1 Overview of Wildlife Habitat						
	Greater Sage Grouse	**Mule Deer**	**Elk**	**Bald Eagle**	**Lynx**	**Bighorn Sheep**
Overall Range	Inundated	Inundated	Inundated	——	Vicinity	Vicinity
Severe Winter	Not Present	Inundated	Vicinity	——	——	Vicinity
Migration Corridors	——	Inundated	Vicinity	——	——	Not Present
Highway Crossing	——	Inundated	Vicinity	——	——	——
Winter Concentration	——	Inundated	Vicinity	Not Present	——	Not Present
Winter Range	Inundated	Inundated	Vicinity	Inundated	——	Not Present
Summer Range	——	Inundated	Inundated	——	——	Not Present
Active Nests	——	——	——	Not Present	——	——

Bald Eagle nesting sites are not present in the area. However, the reservoir site does provide winter forage habitat for Bald Eagles. It is possible that the aquatic environment associated with the reservoir will actually increase forage opportunities for these birds.

Mitigation of terrestrial habitat losses may be required in association with the construction of Wolcott Reservoir. It appears that habitat mitigation will not be insurmountable with sufficient analysis and study. Suggested mitigation efforts include:

- Conduct a collaring program jointly with the Rocky Mountain Elk Foundation. The objective of this analysis is to collar animals within this region to learn about the migration patterns to prove use or non-use in the area. These studies usually last between 3-5 years to obtain sufficient data.
- Include mule deer and elk underpasses in any road construction. These underpasses include fencing and plantings to encourage use.

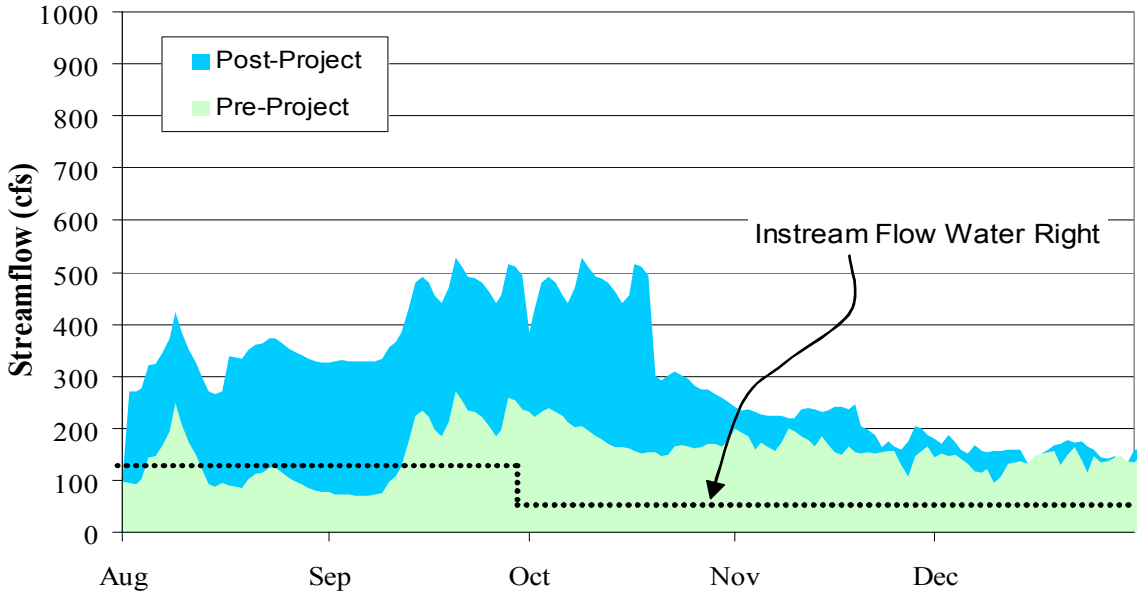
8.3 Downstream Aquatic Habitat

The reservoir would likely improve aquatic habitat in the Eagle River downstream of Wolcott (Figure 8.2). Habitat will improved for the following reasons:

- Stream flow will be increased during critical low flow periods (Figure 8.2)
- Water temperature will be decreased in the late summer months when ambient conditions have exceeded aquatic life standards
- A reduction in sediment loading from the impoundment will decrease sediment deposition on the bed of the Eagle River and enhance aquatic habitat

The reservoir may also enhance aquatic habitat of the Colorado River through the release of water for Recovery Program purposes or for other environmental uses (10825 Water and CFOPS Water).

Figure 8.2
Eagle River near Gypsum - Scenario B
Dry Water Year (2002)



8.4 Reservoir Aquatic Habitat

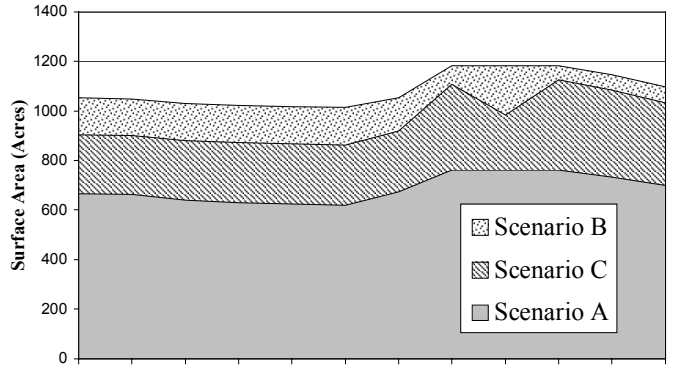
Aquatic habitat and fishing opportunities will also be created in the reservoir. It is anticipated that the reservoir could be managed as a "put-in, take-out" reservoir, or for year round fish habitat. With the put-in, take-out approach, fish would be stocked in the spring. Most of the stocked fish would be caught throughout the summer season. The maintenance of a conservation pool is not critical for this type of habitat.

Simulation results reflect that a conservation pool could likely be maintained in the reservoir at all times. This conservation pool could likely provide wintering habitat and would support a year-round fishery if desired.

8.5 Recreation

The construction of the reservoir will create flat-water recreation opportunities. Actual recreation use may be partially dependent upon the area of the reservoir, and upon the fluctuation of reservoir levels. The simulated surface area of the reservoir is illustrated for an average water year in Figure 8.3. These results reflect that the surface area of the reservoir will typically fluctuate by about 10% to 20% during the summer months. In periods of drought, the surface area of the reservoir will likely fluctuate to a larger extent, as additional reservoir releases are made. The largest fluctuations in surface area are associated with Demand Scenario C. In this scenario, releases for the CFOPS Program can result in expanded reservoir drawdown.

Figure 8.3
Simulated Surface Area of Reservoir
Average Water Year (1980)



8.6 Landfill

The high water line of Wolcott Reservoir is within ¼ mile of an active landfill (Figure 8.4). Upon initial investigation, it appears that geologic conditions may preclude the movement of groundwater from the reservoir to the land fill site. However, a detailed geotechnical analysis should be conducted to determine seepage pathways and groundwater movement in this area.

8.7 Wetlands

Limited areas of wetlands exist along the riparian corridor of Alkali Creek at the reservoir site. The wetlands occupy soils that are classified as Fluvaquents. These soils consist of deep, poorly drained, nearly level slopes formed in alluvium. The water table is generally between depths of 0.5 and 2.0 feet during spring and summer and is occasionally flooded in late spring. Soils range from loamy sand to loamy clay, with some stratification of sand, gravel, and cobbles (Soil Conservation Service, 1992).

To our knowledge, detailed wetland mapping of the site has not been completed. Based on a limited site review, and upon a review of aerial photographs, topography, soil survey maps and vegetation maps, we believe that between 10 and 50 acres of wetlands may be inundated by the reservoir (Figure 8.4). As discussed in Section 8.8, wetland impacts must be mitigated under Section 404 of the Clean Water Act. Given the limited extent of wetlands in the area, it is reasonable to believe that successful mitigation programs can be developed for the site.

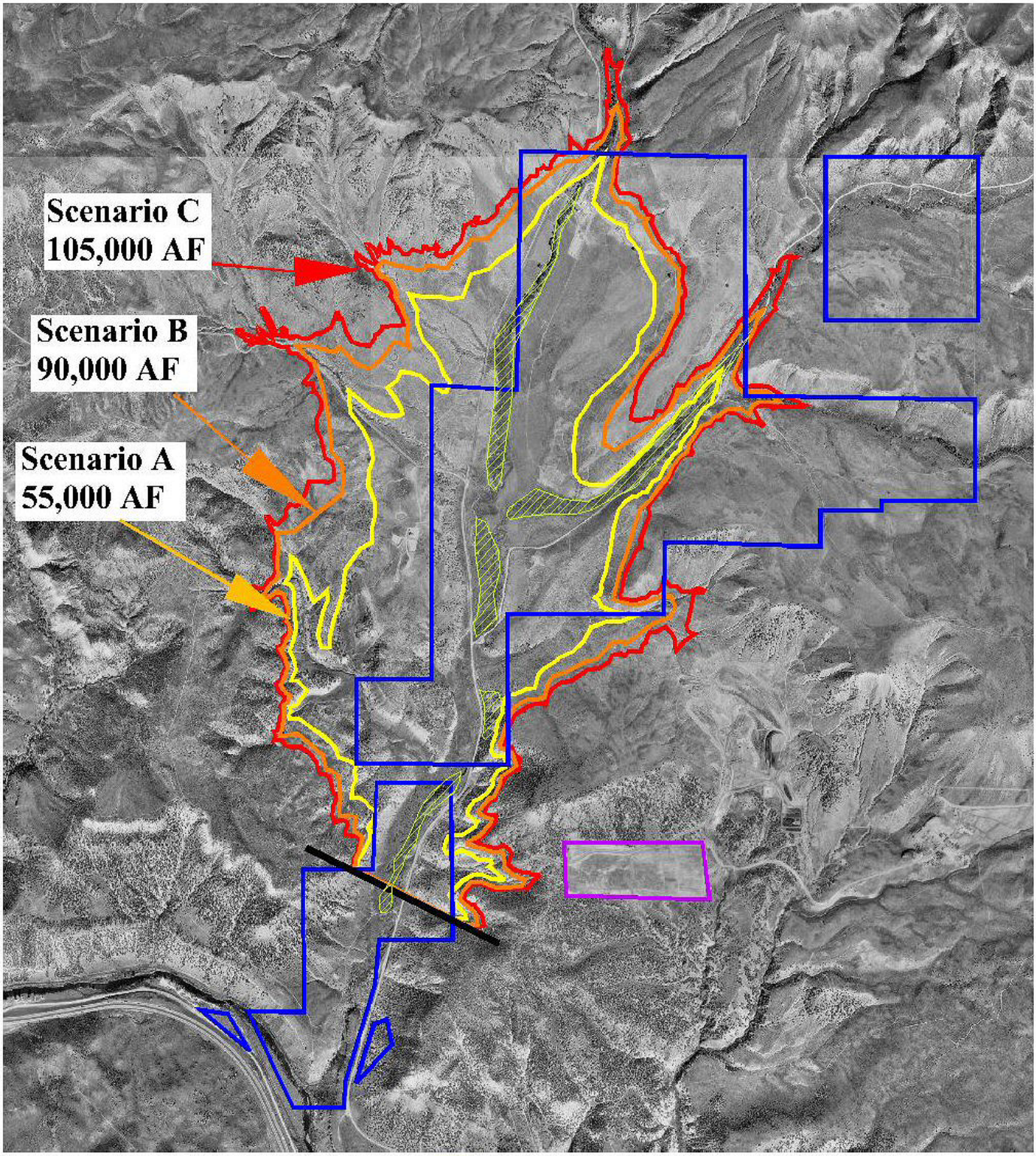


Figure 8.4
Wolcott Dam & Reservoir
Wetlands Inventory

Potential Wetlands
Denver Water Property
Landfill

-5,000 0 5,000 10,000FT

N

8.8 Permitting Requirements / Regulatory Issues

The development of Wolcott Reservoir will be subject to federal, state, and local permitting requirements. The following discussion briefly addresses the primary permitting requirements that may apply to the project.

8.8.1 Special Use Permitting (USDI Bureau of Land Management)

A Special Use Permit from the Bureau of Land Management will be required for the use and occupancy of federal land. The Special Use Permit review process will require the preparation of an Environmental Assessment or an Environmental Impact Statement pursuant to the National Environmental Policy Act (NEPA). The need for an EA and EIS is determined primarily by the significance of the environmental impacts associated with the project. Typically the federal agency upon whose land the project is located (in this instance the BLM) is the lead agency directing the NEPA documentation process. Other entities such as the U.S. Army Corps of Engineers, the U.S. Fish and Wildlife Service, and the Colorado Division of Wildlife also may participate as cooperating agencies.

The NEPA process requires the analysis of several alternatives for achieving the project purpose in addition to the project proponent's preferred alternative. In addition, a "No Action" alternative must be reviewed. Alternatives that are unable to meet project needs or that are not feasible for technical, economic, or environmental reasons would be briefly discussed in the NEPA document and dropped from details analysis.

The NEPA evaluation will include an analysis of the use of federal lands and the compatibility with existing land use management plans. Typically special use permits have conditions that allow conformance with management plans including mitigation measures to minimize or offset resource impacts. Terms and conditions that could affect the viability of a Wolcott Reservoir may be recommended (i.e. instream flow requirements, reservoir operations to maintain preferred lake levels for habitat and recreation, etc.). Additionally, mitigation requirements for impacts to wildlife and natural resources on Federal lands commonly are more stringent than for private land. The NEPA review process for Wolcott Reservoir would like require many years for completion.

8.8.2 County 1041 Permitting

Eagle County has a 1041 permitting process for the review and approval of activities of state interest. It is likely that the NEPA review process would address many of the issues associated with an Eagle County 1041 Permit. However, the County may be interested in the development of specific terms and conditions that could apply to private property that is outside the authority of Federal agencies. We recommend that any 1041 Permit Process be implemented concurrently with Federal review of the facility.

8.8.3 Clean Water Act / 404 Permitting

A Section 404 permit will be required for the construction of the reservoir and related facilities. The U.S. Army Corps of Engineers (COE) is responsible for administration of Section 404 permits for the discharge of dredge or fill materials into waters of the U.S. including wetlands. The Environmental Protection Agency (EPA) maintains veto power over the issuance of 404 permits.

Then COE has two types of permitting actions – individual and general – for authorizing the placement of dredge and fill materials in waters and wetlands. Individuals Permits are required for projects that cannot be authorized by general permits, such as Wolcott Reservoir. As part of the Individual Permit process, the COE would conduct an alternatives analysis that would comply with the 404(b) (1) Guidelines. The EPA would review the COE's analysis. One criterion for compliance with the Guidelines is that the alternative proposed for permitting by the applicant is the least environmentally damaging practicable alternative.

8.8.4 Endangered Species Act / Section 7 Consultation

Section 7 of the Endangered Species Act (ESA) is designed to ensure that any action authorized, funded, or carried out by a federal agency will not jeopardize the continued existence of any endangered or threatened plant or animal species. If a federal action may affect threatened or endangered species, then consultation with the U.S. Fish and Wildlife Service (USFWS) is required. An evaluation under Section 7 includes an analysis of whether the proposed action would result in the destruction or adverse modification of designed critical habitat. If a jeopardy opinion is rendered, then the USFWS must include reasonable and prudent alternatives to the proposed action if they exist. A "no jeopardy" opinion may contain recommendations for conservation.

Section 7 consultation would be conducted concurrently with the NEPA process. Informal consultation with the USFWS would initially address the presence and potential impacts to threatened and endangered species. Surveys and Biological Assessments would be prepared to address potential impacts. A formal Section 7 consultation would be needed if significant impacts are identified that likely would jeopardize the continued existence of threatened and endangered species.

Available information indicates that primary Section 7 issues may relate to threatened and endangered fish habitat in the Colorado River, and potentially to greater sage grouse habitat in the vicinity of the reservoir site.

8.8.5 Other Permitting

Wolcott Reservoir would be subject to the other state and local agencies permitting requirements including:

- Water Quality Certification (401)
- Colorado Pollutant Discharge System Permits (CDPS)
- Colorado Stormwater Pollution Discharge Elimination System Permit (NPDES)
- Air Pollutant Emissions and Open Burning Permit
- Colorado Division of Water Resources Dam Safety Emergency Preparedness Plan
- Colorado Division of Minerals and Geology mining and reclamation permits for borrow pits
- Eagle County grading, construction, and road permits
- The National Historic Preservation Act of 1966

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ATTACHMENT 1

DEMAND SCENARIO A
SCHEDULE OF RELEASES

Attachment 1

Demand Scenario A

RESERVOIR RELEASES FOR 10825 WATER

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	**Total**
1947	2179	0	0	0	0	0	0	0	0	0	1125	2109	**5412**
1948	2179	0	0	0	0	0	0	0	0	0	1125	2109	**5412**
1949	2179	0	0	0	0	0	0	0	0	0	1125	2109	**5412**
1950	2179	0	0	0	0	0	0	0	0	0	1125	2109	**5412**
1951	2179	0	0	0	0	0	0	0	0	0	1125	2109	**5412**
1952	2179	0	0	0	0	0	0	0	0	0	1125	2109	**5412**
1953	2179	0	0	0	0	0	0	0	0	0	1125	2109	**5412**
1954	2179	0	0	0	0	0	0	0	0	0	1125	2109	**5412**
1955	2179	0	0	0	0	0	0	0	0	0	1125	2109	**5412**
1956	2179	0	0	0	0	0	0	0	0	0	1125	2109	**5412**
1957	2179	0	0	0	0	0	0	0	0	0	1125	2109	**5412**
1958	2179	0	0	0	0	0	0	0	0	0	1125	2109	**5412**
1959	2179	0	0	0	0	0	0	0	0	0	1125	2109	**5412**
1960	2179	0	0	0	0	0	0	0	0	0	1125	2109	**5412**
1961	2179	0	0	0	0	0	0	0	0	0	1125	2109	**5412**
1962	2179	0	0	0	0	0	0	0	0	0	1125	2109	**5412**
1963	2179	0	0	0	0	0	0	0	0	0	1125	2109	**5412**
1964	2179	0	0	0	0	0	0	0	0	0	1125	2109	**5412**
1965	2179	0	0	0	0	0	0	0	0	0	1125	2109	**5412**
1966	2179	0	0	0	0	0	0	0	0	0	1125	2109	**5412**
1967	2179	0	0	0	0	0	0	0	0	0	1125	2109	**5412**
1968	2179	0	0	0	0	0	0	0	0	0	1125	2109	**5412**
1969	2179	0	0	0	0	0	0	0	0	0	1125	2109	**5412**
1970	2179	0	0	0	0	0	0	0	0	0	1125	2109	**5412**
1971	2179	0	0	0	0	0	0	0	0	0	1125	2109	**5412**
1972	2179	0	0	0	0	0	0	0	0	0	1125	2109	**5412**
1973	2179	0	0	0	0	0	0	0	0	0	1125	2109	**5412**
1974	2179	0	0	0	0	0	0	0	0	0	1125	2109	**5412**
1975	2179	0	0	0	0	0	0	0	0	0	1125	2109	**5412**
1976	2179	0	0	0	0	0	0	0	0	0	1125	2109	**5412**
1977	2179	0	0	0	0	0	0	0	0	0	1125	2109	**5412**
1978	2179	0	0	0	0	0	0	0	0	0	1125	2109	**5412**
1979	2179	0	0	0	0	0	0	0	0	0	1125	2109	**5412**
1980	2179	0	0	0	0	0	0	0	0	0	1125	2109	**5412**
1981	2179	0	0	0	0	0	0	0	0	0	1125	2109	**5412**
1982	2179	0	0	0	0	0	0	0	0	0	1125	2109	**5412**
1983	2179	0	0	0	0	0	0	0	0	0	1125	2109	**5412**
1984	2179	0	0	0	0	0	0	0	0	0	1125	2109	**5412**
1985	2179	0	0	0	0	0	0	0	0	0	1125	2109	**5412**
1986	2179	0	0	0	0	0	0	0	0	0	1125	2109	**5412**
1987	2179	0	0	0	0	0	0	0	0	0	1125	2109	**5412**
1988	2179	0	0	0	0	0	0	0	0	0	1125	2109	**5412**
1989	2179	0	0	0	0	0	0	0	0	0	1125	2109	**5412**
1990	2179	0	0	0	0	0	0	0	0	0	1125	2109	**5412**
1991	2179	0	0	0	0	0	0	0	0	0	1125	2109	**5412**
1992	2179	0	0	0	0	0	0	0	0	0	1125	2109	**5412**
1993	2179	0	0	0	0	0	0	0	0	0	1125	2109	**5412**
1994	2179	0	0	0	0	0	0	0	0	0	1125	2109	**5412**
1995	2179	0	0	0	0	0	0	0	0	0	1125	2109	**5412**
1996	2179	0	0	0	0	0	0	0	0	0	1125	2109	**5412**
1997	2179	0	0	0	0	0	0	0	0	0	1125	2109	**5412**
1998	2179	0	0	0	0	0	0	0	0	0	1125	2109	**5412**
1999	2179	0	0	0	0	0	0	0	0	0	1125	2109	**5412**
2000	2179	0	0	0	0	0	0	0	0	0	1125	2109	**5412**
2001	2179	0	0	0	0	0	0	0	0	0	1125	2109	**5412**
2002	2179	0	0	0	0	0	0	0	0	0	1125	2109	**5412**
2003	2179	0	0	0	0	0	0	0	0	0	1125	2109	**5412**
Average	**2179**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1125**	**2109**	**5412**

Attachment 1

Demand Scenario A

RESERVOIR RELEASES FOR DENVER WATER EXCHANGE OR SUBSTITUTION

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	**Total**
1947	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1948	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1949	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1950	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1951	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1952	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1953	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1954	0	0	0	0	0	0	0	0	0	5000	2500	2500	**10000**
1955	0	0	0	0	0	0	0	0	0	4500	3000	2500	**10000**
1956	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1957	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1958	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1959	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1960	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1961	0	0	0	0	0	0	0	0	0	5000	2500	2500	**10000**
1962	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1963	0	0	0	0	0	0	0	0	0	5000	2500	2500	**10000**
1964	0	0	0	0	0	0	0	0	0	5000	2500	2500	**10000**
1965	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1966	0	0	0	0	0	0	0	0	0	4500	3500	2000	**10000**
1967	0	0	0	0	0	0	0	0	0	0	4000	3500	**7500**
1968	2500	0	0	0	0	0	0	0	0	0	0	0	**2500**
1969	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1970	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1971	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1972	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1973	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1974	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1975	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1976	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1977	0	0	0	0	0	0	0	0	0	5000	2500	2500	**10000**
1978	0	0	0	0	0	0	0	0	0	0	4000	3500	**7500**
1979	2500	0	0	0	0	0	0	0	0	0	0	0	**2500**
1980	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1981	0	0	0	0	0	0	0	0	0	3000	4000	3000	**10000**
1982	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1983	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1984	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1985	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1986	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1987	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1988	0	0	0	0	0	0	0	0	0	1000	1500	0	**2500**
1989	0	0	0	0	0	0	0	0	0	2500	2500	0	**5000**
1990	0	0	0	0	0	0	0	0	0	3500	4500	2000	**10000**
1991	0	0	0	0	0	0	0	0	0	0	5000	0	**5000**
1992	0	0	0	0	0	0	0	0	0	2500	2500	0	**5000**
1993	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1994	0	0	0	0	0	0	0	0	0	2000	3000	5000	**10000**
1995	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1996	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1997	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1998	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1999	0	0	0	0	0	0	0	0	0	0	0	0	**0**
2000	0	0	0	0	0	0	0	0	0	0	0	0	**0**
2001	0	0	0	0	0	0	0	0	0	1500	5000	2500	**9000**
2002	0	0	0	0	0	0	0	0	0	0	5000	5000	**10000**
2003	0	0	0	0	0	0	0	0	0	1000	1500	0	**2500**
Average	**88**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**895**	**1079**	**728**	**2789**

Attachment 1

Demand Scenario A

RESERVOIR RELEASES FOR WEST SLOPE CONTRACT

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	**Total**
1947	0	200	1600	550	350	300	0	0	0	0	232	843	**4076**
1948	0	133	1600	550	350	300	0	0	0	0	900	1100	**4933**
1949	0	200	1548	550	350	300	0	0	0	0	697	1063	**4708**
1950	0	200	1600	550	350	300	0	0	0	0	900	1100	**5000**
1951	0	200	1600	550	350	300	0	0	0	0	319	953	**4273**
1952	0	200	1600	550	350	300	0	0	0	0	0	880	**3880**
1953	0	193	1600	550	350	300	0	0	0	0	581	1100	**4674**
1954	0	200	1600	550	350	300	0	0	0	0	900	1100	**5000**
1955	0	200	1600	550	350	300	0	0	0	0	842	1100	**4942**
1956	0	200	1600	550	350	300	0	0	0	0	639	1100	**4739**
1957	0	200	1600	550	350	300	0	0	0	0	0	843	**3843**
1958	0	180	1600	550	350	300	0	0	0	0	900	1100	**4980**
1959	0	200	1600	550	350	300	0	0	0	0	842	1063	**4905**
1960	0	187	1600	550	350	203	0	0	0	0	900	1100	**4890**
1961	0	200	1600	550	350	300	0	0	0	0	668	293	**3961**
1962	0	140	1600	550	302	261	0	0	0	0	581	1100	**4534**
1963	0	193	1600	550	350	271	0	0	0	0	581	1100	**4645**
1964	0	200	1600	550	350	300	0	0	0	0	871	1100	**4971**
1965	0	200	1600	550	350	300	0	0	0	0	29	257	**3286**
1966	0	140	1497	550	350	271	0	0	0	0	842	1100	**4750**
1967	0	200	1600	550	350	300	0	0	0	0	900	1100	**5000**
1968	0	200	1600	550	350	300	0	0	0	0	319	1100	**4419**
1969	0	200	1600	550	350	300	0	0	0	0	900	1100	**5000**
1970	0	193	1600	550	350	300	0	0	0	0	406	293	**3693**
1971	0	193	1600	532	350	223	0	0	0	0	610	513	**4021**
1972	0	200	1548	550	350	281	0	0	0	0	900	917	**4746**
1973	0	200	1548	550	350	300	0	0	0	0	319	1100	**4368**
1974	0	200	1600	550	350	290	0	0	0	0	610	1100	**4700**
1975	0	200	1600	550	350	300	0	0	0	0	261	953	**4215**
1976	0	187	1548	550	350	300	0	0	0	0	726	1100	**4761**
1977	0	200	1600	550	350	300	0	0	0	0	900	1100	**5000**
1978	0	200	1600	550	350	300	0	0	0	0	697	1100	**4797**
1979	0	200	1600	550	350	300	0	0	0	0	494	1100	**4594**
1980	0	200	1600	550	350	300	0	0	0	0	871	990	**4861**
1981	0	200	1600	550	350	300	0	0	0	0	900	1027	**4927**
1982	0	200	1600	550	350	300	0	0	0	0	58	807	**3865**
1983	0	180	1600	550	350	300	0	0	0	0	0	587	**3567**
1984	0	47	877	550	350	300	0	0	0	0	0	0	**2124**
1985	0	13	723	337	350	271	0	0	0	0	465	1063	**3222**
1986	0	40	1032	550	229	145	0	0	0	0	290	440	**2727**
1987	0	7	1394	550	350	300	0	0	0	0	842	1100	**4542**
1988	0	200	1600	550	350	300	0	0	0	0	813	1100	**4913**
1989	0	200	1600	550	350	281	0	0	0	0	784	1100	**4865**
1990	0	200	1600	550	350	300	0	0	0	0	900	1100	**5000**
1991	0	200	1600	550	350	300	0	0	0	0	784	1063	**4847**
1992	0	200	1600	550	350	300	0	0	0	0	900	1100	**5000**
1993	0	200	1600	550	350	300	0	0	0	0	290	1100	**4390**
1994	0	200	1600	550	350	300	0	0	0	0	900	1100	**5000**
1995	0	200	1600	550	350	300	0	0	0	0	0	0	**3000**
1996	0	0	0	0	0	0	0	0	0	0	523	1100	**1623**
1997	0	160	1600	0	0	0	0	0	0	0	0	0	**1760**
1998	0	0	0	0	0	0	0	0	0	0	174	1100	**1274**
1999	0	200	1600	550	350	300	0	0	0	0	0	0	**3000**
2000	0	0	0	0	0	0	0	0	0	0	900	990	**1890**
2001	0	200	1600	550	350	300	0	0	0	0	900	1100	**5000**
2002	0	200	1600	550	350	300	0	0	0	0	900	1100	**5000**
2003	0	200	1600	550	350	300	0	0	0	0	900	1100	**5000**
Average	**0**	**172**	**1469**	**507**	**322**	**270**	**0**	**0**	**0**	**0**	**585**	**915**	**4240**

Attachment 1

Demand Scenario A

RESERVOIR RELEASES FOR HOMESTAKE EXCHANGE

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	**Total**
1947	0	0	0	0	0	0	53	0	0	0	110	218	**381**
1948	339	4	0	0	0	0	24	0	0	837	174	0	**1377**
1949	0	0	0	0	0	0	0	0	0	0	240	134	**375**
1950	69	0	0	0	0	0	93	150	0	704	0	0	**1016**
1951	0	0	0	0	0	0	56	55	0	0	129	0	**240**
1952	0	0	0	0	0	0	0	0	0	0	0	21	**21**
1953	0	0	0	0	0	0	119	108	0	0	175	0	**402**
1954	0	0	0	0	0	0	417	442	4856	858	0	0	**6573**
1955	11	0	0	0	0	0	66	0	0	2857	1072	0	**4006**
1956	0	0	0	0	0	0	25	0	0	792	13	0	**830**
1957	0	0	0	0	0	0	5	0	0	0	0	23	**28**
1958	0	0	0	0	0	0	2	0	0	344	0	0	**347**
1959	0	0	0	0	0	0	10	0	0	848	136	0	**994**
1960	37	1	0	0	0	0	32	0	0	1370	409	0	**1849**
1961	0	0	0	0	0	0	19	97	351	1004	95	242	**1808**
1962	228	0	0	0	0	0	0	0	0	0	140	0	**368**
1963	0	0	0	0	0	0	139	0	1131	1057	667	336	**3330**
1964	0	0	0	0	0	0	4	41	0	2240	1143	0	**3427**
1965	0	0	0	0	0	0	0	0	0	0	53	67	**119**
1966	261	0	0	0	0	0	163	0	779	758	418	0	**2379**
1967	0	0	0	0	0	0	0	19	0	489	372	132	**1012**
1968	0	0	0	0	0	0	0	0	0	1239	399	430	**2068**
1969	0	0	0	0	0	0	7	0	0	382	86	0	**475**
1970	0	0	0	0	0	0	0	0	0	0	63	73	**136**
1971	432	0	0	0	0	0	0	0	0	0	976	57	**1465**
1972	0	0	0	0	0	0	0	0	0	679	47	43	**769**
1973	12	0	0	0	0	0	0	0	0	0	54	0	**66**
1974	0	0	0	0	0	0	5	0	0	0	0	0	**5**
1975	0	0	0	0	0	0	9	0	0	0	4	0	**13**
1976	0	0	0	0	0	0	0	0	0	275	100	62	**438**
1977	0	0	0	0	0	0	229	1268	1393	241	0	0	**3131**
1978	11	0	0	0	0	0	51	0	0	0	477	0	**539**
1979	0	0	0	0	0	0	0	0	0	0	257	0	**257**
1980	0	0	0	0	0	0	0	0	0	0	119	0	**119**
1981	0	0	0	0	0	0	358	782	445	614	1	4	**2204**
1982	0	0	0	0	0	0	0	0	0	0	78	152	**231**
1983	6	0	0	0	0	0	0	0	0	0	0	1	**7**
1984	0	0	0	0	0	0	16	0	0	0	0	0	**16**
1985	41	15	0	0	0	0	0	0	0	0	0	0	**57**
1986	182	24	0	0	0	0	0	0	0	0	0	0	**206**
1987	91	0	0	0	0	0	0	0	0	151	249	0	**491**
1988	0	0	0	0	0	0	0	0	0	0	6	0	**6**
1989	0	0	0	0	0	73	40	11	0	885	107	0	**1117**
1990	0	0	0	0	0	0	0	126	0	893	0	9	**1028**
1991	1	0	0	0	0	0	0	27	0	203	114	81	**426**
1992	0	0	0	0	0	0	0	0	0	551	263	78	**891**
1993	0	0	0	0	0	0	0	0	0	0	75	335	**410**
1994	0	0	0	0	0	0	0	0	283	900	37	120	**1341**
1995	0	0	0	0	0	0	0	91	0	0	0	0	**91**
1996	0	0	0	0	0	0	0	0	0	0	4	56	**61**
1997	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1998	0	0	0	0	0	0	0	0	0	0	251	171	**422**
1999	0	0	0	0	0	0	1	0	0	0	0	0	**1**
2000	0	0	0	0	0	0	0	0	0	187	50	120	**357**
2001	0	0	0	0	0	0	262	0	1075	1775	433	0	**3544**
2002	0	0	0	0	0	0	271	0	2437	13	0	8	**2729**
2003	4	0	0	0	0	0	0	0	0	1104	34	231	**1373**
Average	**30**	**1**	**0**	**0**	**0**	**1**	**43**	**56**	**224**	**425**	**169**	**56**	**1006**

Attachment 1

Demand Scenario A

TOTAL RESERVOIR RELEASES

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	**Total**
1947	2179	200	1600	550	350	300	53	0	0	0	1467	3170	**9869**
1948	2518	137	1600	550	350	300	24	0	0	837	2198	3209	**11722**
1949	2179	200	1548	550	350	300	0	0	0	0	2062	3306	**10495**
1950	2248	200	1600	550	350	300	93	150	0	704	2025	3209	**11428**
1951	2179	200	1600	550	350	300	56	55	0	0	1573	3062	**9924**
1952	2179	200	1600	550	350	300	0	0	0	0	1125	3009	**9313**
1953	2179	193	1600	550	350	300	119	108	0	0	1881	3209	**10488**
1954	2179	200	1600	550	350	300	417	442	4856	5858	4525	5709	**26985**
1955	2190	200	1600	550	350	300	66	0	0	7357	6038	5709	**24360**
1956	2179	200	1600	550	350	300	25	0	0	792	1776	3209	**10980**
1957	2179	200	1600	550	350	300	5	0	0	0	1125	2975	**9283**
1958	2179	180	1600	550	350	300	2	0	0	344	2025	3209	**10739**
1959	2179	200	1600	550	350	300	10	0	0	848	2102	3172	**11312**
1960	2216	187	1600	550	350	203	32	0	0	1370	2433	3209	**12151**
1961	2179	200	1600	550	350	300	19	97	351	6004	4387	5144	**21181**
1962	2407	140	1600	550	302	261	0	0	0	0	1845	3209	**10314**
1963	2179	193	1600	550	350	271	139	0	1131	6057	4872	6044	**23387**
1964	2179	200	1600	550	350	300	4	41	0	7240	5639	5709	**23810**
1965	2179	200	1600	550	350	300	0	0	0	0	1206	2432	**8817**
1966	2440	140	1497	550	350	271	163	0	779	5258	5885	5209	**22540**
1967	2179	200	1600	550	350	300	0	19	0	489	6397	6840	**18924**
1968	4679	200	1600	550	350	300	0	0	0	1239	1843	3639	**14399**
1969	2179	200	1600	550	350	300	7	0	0	382	2110	3209	**10887**
1970	2179	193	1600	550	350	300	0	0	0	0	1594	2475	**9241**
1971	2611	193	1600	532	350	223	0	0	0	0	2710	2679	**10898**
1972	2179	200	1548	550	350	281	0	0	0	679	2071	3069	**10927**
1973	2191	200	1548	550	350	300	0	0	0	0	1497	3209	**9846**
1974	2179	200	1600	550	350	290	5	0	0	0	1734	3209	**10117**
1975	2179	200	1600	550	350	300	9	0	0	0	1389	3062	**9639**
1976	2179	187	1548	550	350	300	0	0	0	275	1951	3271	**10610**
1977	2179	200	1600	550	350	300	229	1268	1393	5241	4525	5709	**23543**
1978	2190	200	1600	550	350	300	51	0	0	0	6298	6709	**18248**
1979	4679	200	1600	550	350	300	0	0	0	0	1875	3209	**12763**
1980	2179	200	1600	550	350	300	0	0	0	0	2114	3099	**10392**
1981	2179	200	1600	550	350	300	358	782	445	3614	6025	6139	**22543**
1982	2179	200	1600	550	350	300	0	0	0	0	1261	3068	**9507**
1983	2185	180	1600	550	350	300	0	0	0	0	1125	2696	**8986**
1984	2179	47	877	550	350	300	16	0	0	0	1125	2109	**7552**
1985	2220	29	723	337	350	271	0	0	0	0	1589	3172	**8691**
1986	2361	64	1032	550	229	145	0	0	0	0	1415	2549	**8345**
1987	2269	7	1394	550	350	300	0	0	0	151	2216	3209	**10445**
1988	2179	200	1600	550	350	300	0	0	0	1000	3444	3209	**12831**
1989	2179	200	1600	550	350	354	40	11	0	3385	4516	3209	**16394**
1990	2179	200	1600	550	350	300	0	126	0	4393	6525	5217	**21440**
1991	2180	200	1600	550	350	300	0	27	0	203	7023	3253	**15685**
1992	2179	200	1600	550	350	300	0	0	0	3051	4787	3286	**16303**
1993	2179	200	1600	550	350	300	0	0	0	0	1490	3543	**10212**
1994	2179	200	1600	550	350	300	0	0	283	2900	5061	8329	**21753**
1995	2179	200	1600	550	350	300	0	91	0	0	1125	2109	**8503**
1996	2179	0	0	0	0	0	0	0	0	0	1652	3265	**7095**
1997	2179	160	1600	0	0	0	0	0	0	0	1125	2109	**7172**
1998	2179	0	0	0	0	0	0	0	0	0	1550	3379	**7108**
1999	2179	200	1600	550	350	300	1	0	0	0	1125	2109	**8413**
2000	2179	0	0	0	0	0	0	0	0	187	2074	3218	**7659**
2001	2179	200	1600	550	350	300	262	0	1075	3275	7457	5709	**22956**
2002	2179	200	1600	550	350	300	271	0	2437	13	7025	8217	**23141**
2003	2183	200	1600	550	350	300	0	0	0	2104	3559	3440	**14285**
Average	**2297**	**172**	**1469**	**507**	**322**	**271**	**43**	**56**	**224**	**1320**	**2958**	**3808**	**13448**

ATTACHMENT 2

DEMAND SCENARIO B
SCHEDULE OF RELEASES

Attachment 2

Demand Scenario B

RESERVOIR RELEASES FOR 10825 WATER

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	**Total**
1947	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1948	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1949	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1950	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1951	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1952	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1953	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1954	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1955	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1956	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1957	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1958	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1959	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1960	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1961	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1962	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1963	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1964	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1965	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1966	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1967	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1968	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1969	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1970	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1971	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1972	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1973	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1974	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1975	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1976	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1977	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1978	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1979	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1980	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1981	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1982	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1983	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1984	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1985	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1986	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1987	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1988	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1989	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1990	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1991	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1992	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1993	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1994	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1995	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1996	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1997	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1998	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1999	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
2000	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
2001	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
2002	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
2003	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
Average	**4358**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2249**	**4218**	**10825**

Attachment 2

Demand Scenario B

RESERVOIR RELEASES FOR DENVER EXCHANGE OR SUBSTITUTION

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	**Total**
1947	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1948	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1949	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1950	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1951	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1952	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1953	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1954	0	0	0	0	0	0	0	0	0	10000	5000	5000	**20000**
1955	0	0	0	0	0	0	0	0	0	9000	6000	5000	**20000**
1956	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1957	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1958	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1959	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1960	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1961	0	0	0	0	0	0	0	0	0	10000	5000	5000	**20000**
1962	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1963	0	0	0	0	0	0	0	0	0	10000	5000	5000	**20000**
1964	0	0	0	0	0	0	0	0	0	10000	5000	5000	**20000**
1965	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1966	0	0	0	0	0	0	0	0	0	9000	7000	4000	**20000**
1967	0	0	0	0	0	0	0	0	0	0	8000	7000	**15000**
1968	5000	0	0	0	0	0	0	0	0	0	0	0	**5000**
1969	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1970	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1971	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1972	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1973	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1974	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1975	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1976	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1977	0	0	0	0	0	0	0	0	0	10000	5000	5000	**20000**
1978	0	0	0	0	0	0	0	0	0	0	8000	7000	**15000**
1979	5000	0	0	0	0	0	0	0	0	0	0	0	**5000**
1980	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1981	0	0	0	0	0	0	0	0	0	6000	8000	6000	**20000**
1982	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1983	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1984	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1985	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1986	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1987	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1988	0	0	0	0	0	0	0	0	0	2000	3000	0	**5000**
1989	0	0	0	0	0	0	0	0	0	5000	5000	0	**10000**
1990	0	0	0	0	0	0	0	0	0	7000	9000	4000	**20000**
1991	0	0	0	0	0	0	0	0	0	0	10000	0	**10000**
1992	0	0	0	0	0	0	0	0	0	5000	5000	0	**10000**
1993	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1994	0	0	0	0	0	0	0	0	0	4000	6000	10000	**20000**
1995	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1996	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1997	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1998	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1999	0	0	0	0	0	0	0	0	0	0	0	0	**0**
2000	0	0	0	0	0	0	0	0	0	0	0	0	**0**
2001	0	0	0	0	0	0	0	0	0	3000	10000	5000	**18000**
2002	0	0	0	0	0	0	0	0	0	0	10000	10000	**20000**
2003	0	0	0	0	0	0	0	0	0	2000	3000	0	**5000**
Average	**175**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1789**	**2158**	**1456**	**5579**

Attachment 2

Demand Scenario B

RESERVOIR RELEASES FOR THE WEST SLOPE CONTRACT

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	**Total**
1947	0	200	1600	550	350	300	0	0	0	0	232	843	**4076**
1948	0	133	1600	550	350	300	0	0	0	0	900	1100	**4933**
1949	0	200	1548	550	350	300	0	0	0	0	697	1063	**4708**
1950	0	200	1600	550	350	300	0	0	0	0	900	1100	**5000**
1951	0	200	1600	550	350	300	0	0	0	0	319	953	**4273**
1952	0	200	1600	550	350	300	0	0	0	0	0	880	**3880**
1953	0	193	1600	550	350	300	0	0	0	0	581	1100	**4674**
1954	0	200	1600	550	350	300	0	0	0	0	900	1100	**5000**
1955	0	200	1600	550	350	300	0	0	0	0	842	1100	**4942**
1956	0	200	1600	550	350	300	0	0	0	0	639	1100	**4739**
1957	0	200	1600	550	350	300	0	0	0	0	0	843	**3843**
1958	0	180	1600	550	350	300	0	0	0	0	900	1100	**4980**
1959	0	200	1600	550	350	300	0	0	0	0	842	1063	**4905**
1960	0	187	1600	550	350	203	0	0	0	0	900	1100	**4890**
1961	0	200	1600	550	350	300	0	0	0	0	668	293	**3961**
1962	0	140	1600	550	302	261	0	0	0	0	581	1100	**4534**
1963	0	193	1600	550	350	271	0	0	0	0	581	1100	**4645**
1964	0	200	1600	550	350	300	0	0	0	0	871	1100	**4971**
1965	0	200	1600	550	350	300	0	0	0	0	29	257	**3286**
1966	0	140	1497	550	350	271	0	0	0	0	842	1100	**4750**
1967	0	200	1600	550	350	300	0	0	0	0	900	1100	**5000**
1968	0	200	1600	550	350	300	0	0	0	0	319	1100	**4419**
1969	0	200	1600	550	350	300	0	0	0	0	900	1100	**5000**
1970	0	193	1600	550	350	300	0	0	0	0	406	293	**3693**
1971	0	193	1600	532	350	223	0	0	0	0	610	513	**4021**
1972	0	200	1548	550	350	281	0	0	0	0	900	917	**4746**
1973	0	200	1548	550	350	300	0	0	0	0	319	1100	**4368**
1974	0	200	1600	550	350	290	0	0	0	0	610	1100	**4700**
1975	0	200	1600	550	350	300	0	0	0	0	261	953	**4215**
1976	0	187	1548	550	350	300	0	0	0	0	726	1100	**4761**
1977	0	200	1600	550	350	300	0	0	0	0	900	1100	**5000**
1978	0	200	1600	550	350	300	0	0	0	0	697	1100	**4797**
1979	0	200	1600	550	350	300	0	0	0	0	494	1100	**4594**
1980	0	200	1600	550	350	300	0	0	0	0	871	990	**4861**
1981	0	200	1600	550	350	300	0	0	0	0	900	1027	**4927**
1982	0	200	1600	550	350	300	0	0	0	0	58	807	**3865**
1983	0	180	1600	550	350	300	0	0	0	0	0	587	**3567**
1984	0	47	877	550	350	300	0	0	0	0	0	0	**2124**
1985	0	13	723	337	350	271	0	0	0	0	465	1063	**3222**
1986	0	40	1032	550	229	145	0	0	0	0	290	440	**2727**
1987	0	7	1394	550	350	300	0	0	0	0	842	1100	**4542**
1988	0	200	1600	550	350	300	0	0	0	0	813	1100	**4913**
1989	0	200	1600	550	350	281	0	0	0	0	784	1100	**4865**
1990	0	200	1600	550	350	300	0	0	0	0	900	1100	**5000**
1991	0	200	1600	550	350	300	0	0	0	0	784	1063	**4847**
1992	0	200	1600	550	350	300	0	0	0	0	900	1100	**5000**
1993	0	200	1600	550	350	300	0	0	0	0	290	1100	**4390**
1994	0	200	1600	550	350	300	0	0	0	0	900	1100	**5000**
1995	0	200	1600	550	350	300	0	0	0	0	0	0	**3000**
1996	0	0	0	0	0	0	0	0	0	0	523	1100	**1623**
1997	0	160	1600	0	0	0	0	0	0	0	0	0	**1760**
1998	0	0	0	0	0	0	0	0	0	0	174	1100	**1274**
1999	0	200	1600	550	350	300	0	0	0	0	0	0	**3000**
2000	0	0	0	0	0	0	0	0	0	0	900	990	**1890**
2001	0	200	1600	550	350	300	0	0	0	0	900	1100	**5000**
2002	0	200	1600	550	350	300	0	0	0	0	900	1100	**5000**
2003	0	200	1600	550	350	300	0	0	0	0	900	1100	**5000**
Average	**0**	**172**	**1469**	**507**	**322**	**270**	**0**	**0**	**0**	**0**	**585**	**915**	**4240**

Attachment 2

Demand Scenario B

RESERVOIR RELEASES FOR HOMESTAKE EXCHANGE

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	**Total**
1947	0	0	0	0	0	0	53	0	0	0	110	218	**381**
1948	339	4	0	0	0	0	24	0	0	837	174	0	**1377**
1949	0	0	0	0	0	0	0	0	0	0	240	134	**375**
1950	69	0	0	0	0	0	93	150	0	704	0	0	**1016**
1951	0	0	0	0	0	0	56	55	0	0	129	0	**240**
1952	0	0	0	0	0	0	0	0	0	0	0	21	**21**
1953	0	0	0	0	0	0	119	108	0	0	175	0	**402**
1954	0	0	0	0	0	0	417	442	4856	858	0	0	**6573**
1955	11	0	0	0	0	0	66	0	0	2857	1072	0	**4006**
1956	0	0	0	0	0	0	25	0	0	792	13	0	**830**
1957	0	0	0	0	0	0	5	0	0	0	0	23	**28**
1958	0	0	0	0	0	0	2	0	0	344	0	0	**347**
1959	0	0	0	0	0	0	10	0	0	848	136	0	**994**
1960	37	1	0	0	0	0	32	0	0	1370	409	0	**1849**
1961	0	0	0	0	0	0	19	97	351	1004	95	242	**1808**
1962	228	0	0	0	0	0	0	0	0	0	140	0	**368**
1963	0	0	0	0	0	0	139	0	1131	1057	667	336	**3330**
1964	0	0	0	0	0	0	4	41	0	2240	1143	0	**3427**
1965	0	0	0	0	0	0	0	0	0	0	53	67	**119**
1966	261	0	0	0	0	0	163	0	779	758	418	0	**2379**
1967	0	0	0	0	0	0	0	19	0	489	372	132	**1012**
1968	0	0	0	0	0	0	0	0	0	1239	399	430	**2068**
1969	0	0	0	0	0	0	7	0	0	382	86	0	**475**
1970	0	0	0	0	0	0	0	0	0	0	63	73	**136**
1971	432	0	0	0	0	0	0	0	0	0	976	57	**1465**
1972	0	0	0	0	0	0	0	0	0	679	47	43	**769**
1973	12	0	0	0	0	0	0	0	0	0	54	0	**66**
1974	0	0	0	0	0	0	5	0	0	0	0	0	**5**
1975	0	0	0	0	0	0	9	0	0	0	4	0	**13**
1976	0	0	0	0	0	0	0	0	0	275	100	62	**438**
1977	0	0	0	0	0	0	229	1268	1393	241	0	0	**3131**
1978	11	0	0	0	0	0	51	0	0	0	477	0	**539**
1979	0	0	0	0	0	0	0	0	0	0	257	0	**257**
1980	0	0	0	0	0	0	0	0	0	0	119	0	**119**
1981	0	0	0	0	0	0	358	782	445	614	1	4	**2204**
1982	0	0	0	0	0	0	0	0	0	0	78	152	**231**
1983	6	0	0	0	0	0	0	0	0	0	0	1	**7**
1984	0	0	0	0	0	0	16	0	0	0	0	0	**16**
1985	41	15	0	0	0	0	0	0	0	0	0	0	**57**
1986	182	24	0	0	0	0	0	0	0	0	0	0	**206**
1987	91	0	0	0	0	0	0	0	0	151	249	0	**491**
1988	0	0	0	0	0	0	0	0	0	0	6	0	**6**
1989	0	0	0	0	0	73	40	11	0	885	107	0	**1117**
1990	0	0	0	0	0	0	0	126	0	893	0	9	**1028**
1991	1	0	0	0	0	0	0	27	0	203	114	81	**426**
1992	0	0	0	0	0	0	0	0	0	551	263	78	**891**
1993	0	0	0	0	0	0	0	0	0	0	75	335	**410**
1994	0	0	0	0	0	0	0	0	283	900	37	120	**1341**
1995	0	0	0	0	0	0	0	91	0	0	0	0	**91**
1996	0	0	0	0	0	0	0	0	0	0	4	56	**61**
1997	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1998	0	0	0	0	0	0	0	0	0	0	251	171	**422**
1999	0	0	0	0	0	0	1	0	0	0	0	0	**1**
2000	0	0	0	0	0	0	0	0	0	187	50	120	**357**
2001	0	0	0	0	0	0	262	0	1075	1775	433	0	**3544**
2002	0	0	0	0	0	0	271	0	2437	13	0	8	**2729**
2003	4	0	0	0	0	0	0	0	0	1073	34	231	**1343**
Average	**30**	**1**	**0**	**0**	**0**	**1**	**43**	**56**	**224**	**425**	**169**	**56**	**1006**

Attachment 2

Demand Scenario B

RESERVOIR RELEASES FOR CAMP HALE EXCHANGE

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	**Total**
1947	651	473	86	47	189	419	622	0	0	0	97	103	**2685**
1948	687	380	240	74	213	391	338	0	0	359	228	0	**2910**
1949	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1950	538	312	93	121	132	291	756	383	0	439	72	2	**3139**
1951	381	333	298	183	236	328	527	161	0	0	130	1	**2579**
1952	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1953	261	176	238	135	240	272	363	259	0	0	88	0	**2031**
1954	132	68	55	127	80	40	847	352	1096	245	0	2	**3046**
1955	74	11	5	0	0	85	426	0	0	276	175	0	**1052**
1956	85	75	63	57	2	108	248	0	0	216	14	0	**869**
1957	63	71	33	24	5	15	76	0	0	0	0	116	**404**
1958	485	246	219	94	69	26	224	2	0	309	0	0	**1675**
1959	168	96	35	7	0	0	146	0	0	401	190	16	**1059**
1960	391	122	15	34	1	0	75	0	0	554	133	0	**1326**
1961	159	73	10	9	13	0	308	147	110	571	97	64	**1562**
1962	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1963	368	115	50	0	0	46	641	0	168	224	430	278	**2319**
1964	240	72	0	0	0	0	251	245	0	409	255	0	**1472**
1965	101	3	0	0	0	32	181	0	0	0	17	119	**454**
1966	464	168	138	148	83	86	759	0	287	342	20	0	**2494**
1967	155	10	1	1	0	85	275	56	0	159	129	39	**910**
1968	219	94	65	28	20	50	182	6	0	210	258	310	**1441**
1969	438	121	28	10	0	11	163	0	0	139	181	9	**1100**
1970	351	139	59	49	85	159	221	25	0	0	117	40	**1245**
1971	531	496	229	83	24	13	93	0	0	0	402	0	**1873**
1972	189	146	112	108	38	166	256	38	0	149	14	7	**1223**
1973	272	275	20	0	0	5	569	0	0	0	81	37	**1258**
1974	302	169	44	0	0	77	310	0	0	0	26	0	**929**
1975	251	107	31	0	0	0	30	18	0	0	63	55	**555**
1976	253	152	20	0	0	6	321	0	0	144	83	4	**984**
1977	75	8	0	3	2	20	904	1122	362	74	0	0	**2570**
1978	64	47	4	0	0	44	154	0	0	0	112	0	**425**
1979	195	94	12	27	19	24	21	0	0	0	58	0	**449**
1980	189	145	59	58	30	6	29	0	0	0	99	4	**618**
1981	146	16	0	0	0	0	450	434	80	83	7	0	**1216**
1982	176	64	19	17	4	9	135	0	0	0	8	26	**458**
1983	545	245	217	125	60	104	117	2	0	0	0	139	**1555**
1984	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1985	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1986	265	49	189	119	42	57	0	0	0	0	97	68	**887**
1987	352	12	161	17	1	39	120	0	0	102	15	0	**820**
1988	168	246	48	2	0	52	76	0	0	45	7	0	**644**
1989	60	54	43	0	0	31	78	51	0	341	118	0	**777**
1990	51	36	0	0	0	8	148	111	0	279	0	0	**634**
1991	185	87	4	0	0	0	196	78	0	53	118	0	**722**
1992	136	382	141	0	0	4	158	0	0	273	75	8	**1178**
1993	176	241	53	6	8	124	84	0	0	0	39	17	**747**
1994	411	335	95	9	12	81	89	0	85	312	0	33	**1462**
1995	127	26	0	0	0	64	164	223	0	0	0	0	**605**
1996	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1997	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1998	0	0	0	0	0	0	0	0	0	0	14	12	**27**
1999	396	126	21	0	1	156	385	0	0	0	0	0	**1086**
2000	0	0	0	0	0	0	149	0	0	123	89	24	**385**
2001	192	296	269	81	105	211	598	0	172	725	121	0	**2770**
2002	125	84	15	0	0	6	1036	0	418	12	0	0	**1696**
2003	6	6	0	0	0	97	18	0	0	258	9	8	**402**
Average	**215**	**125**	**62**	**32**	**30**	**67**	**251**	**65**	**49**	**137**	**75**	**27**	**1136**

Attachment 2

Demand Scenario B

TOTAL RESERVOIR RELEASES

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	**Total**
1947	5009	673	1686	597	539	719	675	0	0	0	2688	5382	**17967**
1948	5384	517	1840	624	563	691	362	0	0	1197	3551	5318	**20046**
1949	4358	200	1548	550	350	300	0	0	0	0	3187	5415	**15908**
1950	4964	512	1693	671	482	591	850	532	0	1143	3221	5320	**19980**
1951	4739	533	1898	733	586	628	583	216	0	0	2827	5171	**17916**
1952	4358	200	1600	550	350	300	0	0	0	0	2249	5118	**14726**
1953	4619	369	1838	685	590	572	482	367	0	0	3093	5318	**17932**
1954	4491	268	1655	677	430	340	1264	794	5952	11104	8149	10320	**45443**
1955	4443	211	1605	550	350	385	492	0	0	12132	10338	10318	**40824**
1956	4444	275	1663	607	352	408	273	0	0	1007	2915	5318	**17262**
1957	4421	271	1633	574	355	315	81	0	0	0	2249	5200	**15100**
1958	4843	426	1819	644	419	326	227	2	0	653	3149	5318	**17826**
1959	4526	296	1635	557	350	300	156	0	0	1250	3417	5297	**17784**
1960	4787	309	1615	584	351	203	108	0	0	1924	3692	5318	**18891**
1961	4517	273	1610	559	363	300	328	244	461	11575	8109	9817	**38156**
1962	4586	140	1600	550	302	261	0	0	0	0	2970	5318	**15727**
1963	4726	309	1650	550	350	317	780	0	1299	11281	8927	10932	**41119**
1964	4598	272	1600	550	350	300	255	286	0	12649	9518	10318	**40695**
1965	4460	203	1600	550	350	332	181	0	0	0	2348	4660	**14684**
1966	5083	308	1635	698	433	357	921	0	1066	10100	10530	9318	**40447**
1967	4513	210	1601	551	350	385	275	75	0	648	11651	12488	**32747**
1968	9577	294	1665	578	370	350	182	6	0	1448	3226	6058	**23753**
1969	4796	321	1628	560	350	311	169	0	0	522	3416	5327	**17400**
1970	4709	332	1659	599	435	459	221	25	0	0	2836	4624	**15899**
1971	5322	689	1829	616	374	236	93	0	0	0	4237	4788	**18184**
1972	4547	346	1661	658	388	447	256	38	0	828	3210	5184	**17562**
1973	4642	475	1569	550	350	305	569	0	0	0	2703	5354	**16517**
1974	4660	369	1644	550	350	368	315	0	0	0	2885	5318	**16459**
1975	4609	307	1631	550	350	300	39	18	0	0	2577	5226	**15607**
1976	4611	339	1569	550	350	306	321	0	0	419	3158	5384	**17008**
1977	4433	208	1600	553	352	320	1133	2390	1755	10314	8149	10318	**41526**
1978	4433	247	1604	550	350	344	205	0	0	0	11535	12318	**31586**
1979	9553	294	1612	577	369	324	21	0	0	0	3058	5318	**21125**
1980	4547	345	1659	608	380	306	29	0	0	0	3338	5212	**16422**
1981	4504	216	1600	550	350	300	808	1217	526	6697	11157	11248	**39172**
1982	4534	264	1619	567	354	309	135	0	0	0	2394	5203	**15378**
1983	4909	425	1817	675	410	404	117	2	0	0	2249	4943	**15954**
1984	4358	47	877	550	350	300	16	0	0	0	2249	4218	**12965**
1985	4399	29	723	337	350	271	0	0	0	0	2714	5281	**14104**
1986	4805	113	1222	669	272	202	0	0	0	0	2637	4725	**14645**
1987	4801	19	1554	567	351	339	120	0	0	253	3356	5318	**16678**
1988	4526	446	1648	552	350	352	76	0	0	2045	6075	5318	**21388**
1989	4419	254	1643	550	350	385	118	62	0	6226	8259	5318	**27584**
1990	4409	236	1600	550	350	308	148	237	0	8172	12149	9326	**37487**
1991	4544	287	1604	550	350	300	196	105	0	256	13265	5362	**26820**
1992	4494	582	1741	550	350	304	158	0	0	5823	8488	5404	**27894**
1993	4534	441	1653	556	358	424	84	0	0	0	2653	5670	**16372**
1994	4769	535	1695	559	362	381	89	0	369	5212	9186	15470	**38627**
1995	4485	226	1600	550	350	364	164	315	0	0	2249	4218	**14521**
1996	4358	0	0	0	0	0	0	0	0	0	2776	5374	**12508**
1997	4358	160	1600	0	0	0	0	0	0	0	2249	4218	**12585**
1998	4358	0	0	0	0	0	0	0	0	0	2689	5501	**12548**
1999	4754	326	1621	550	351	456	387	0	0	0	2249	4218	**14912**
2000	4358	0	0	0	0	0	149	0	0	310	3288	5352	**13457**
2001	4550	496	1869	631	455	511	859	0	1247	5500	13703	10318	**40139**
2002	4483	284	1615	550	350	306	1307	0	2854	25	13149	15326	**40250**
2003	4369	206	1600	550	350	397	18	0	0	3326	6192	5557	**22565**
Average	**4779**	**297**	**1531**	**539**	**353**	**339**	**295**	**122**	**272**	**2352**	**5237**	**6672**	**22786**

ATTACHMENT 3

DEMAND SCENARIO C
SCHEDULE OF RELEASES

Attachment 3

Demand Scenario C

RESERVOIR RELEASES FOR 10825 WATER

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	**Total**
1947	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1948	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1949	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1950	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1951	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1952	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1953	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1954	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1955	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1956	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1957	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1958	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1959	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1960	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1961	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1962	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1963	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1964	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1965	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1966	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1967	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1968	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1969	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1970	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1971	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1972	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1973	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1974	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1975	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1976	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1977	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1978	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1979	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1980	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1981	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1982	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1983	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1984	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1985	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1986	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1987	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1988	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1989	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1990	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1991	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1992	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1993	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1994	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1995	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1996	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1997	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1998	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
1999	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
2000	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
2001	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
2002	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
2003	4358	0	0	0	0	0	0	0	0	0	2249	4218	**10825**
Average	**4358**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2249**	**4218**	**10825**

Attachment 3

Demand Scenario C

RESERVOIR RELEASES FOR DENVER EXCHANGE OR SUBSTITUTION

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	**Total**
1947	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1948	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1949	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1950	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1951	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1952	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1953	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1954	0	0	0	0	0	0	0	0	0	10000	5000	5000	**20000**
1955	0	0	0	0	0	0	0	0	0	9000	6000	5000	**20000**
1956	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1957	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1958	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1959	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1960	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1961	0	0	0	0	0	0	0	0	0	10000	5000	5000	**20000**
1962	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1963	0	0	0	0	0	0	0	0	0	10000	5000	5000	**20000**
1964	0	0	0	0	0	0	0	0	0	10000	5000	5000	**20000**
1965	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1966	0	0	0	0	0	0	0	0	0	9000	7000	4000	**20000**
1967	0	0	0	0	0	0	0	0	0	0	8000	7000	**15000**
1968	5000	0	0	0	0	0	0	0	0	0	0	0	**5000**
1969	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1970	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1971	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1972	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1973	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1974	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1975	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1976	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1977	0	0	0	0	0	0	0	0	0	10000	5000	5000	**20000**
1978	0	0	0	0	0	0	0	0	0	0	8000	7000	**15000**
1979	5000	0	0	0	0	0	0	0	0	0	0	0	**5000**
1980	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1981	0	0	0	0	0	0	0	0	0	6000	8000	6000	**20000**
1982	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1983	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1984	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1985	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1986	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1987	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1988	0	0	0	0	0	0	0	0	0	2000	3000	0	**5000**
1989	0	0	0	0	0	0	0	0	0	5000	5000	0	**10000**
1990	0	0	0	0	0	0	0	0	0	7000	9000	4000	**20000**
1991	0	0	0	0	0	0	0	0	0	0	10000	0	**10000**
1992	0	0	0	0	0	0	0	0	0	5000	5000	0	**10000**
1993	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1994	0	0	0	0	0	0	0	0	0	4000	6000	10000	**20000**
1995	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1996	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1997	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1998	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1999	0	0	0	0	0	0	0	0	0	0	0	0	**0**
2000	0	0	0	0	0	0	0	0	0	0	0	0	**0**
2001	0	0	0	0	0	0	0	0	0	3000	10000	5000	**18000**
2002	0	0	0	0	0	0	0	0	0	0	10000	10000	**20000**
2003	0	0	0	0	0	0	0	0	0	2000	3000	0	**5000**
Average	**175**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1789**	**2158**	**1456**	**5579**

Attachment 3

Demand Scenario C

RESERVOIR RELEASES FOR THE WEST SLOPE CONTRACT

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	**Total**
1947	0	200	1600	550	350	300	0	0	0	0	232	843	**4076**
1948	0	133	1600	550	350	300	0	0	0	0	900	1100	**4933**
1949	0	200	1548	550	350	300	0	0	0	0	697	1063	**4708**
1950	0	200	1600	550	350	300	0	0	0	0	900	1100	**5000**
1951	0	200	1600	550	350	300	0	0	0	0	319	953	**4273**
1952	0	200	1600	550	350	300	0	0	0	0	0	880	**3880**
1953	0	193	1600	550	350	300	0	0	0	0	581	1100	**4674**
1954	0	200	1600	550	350	300	0	0	0	0	900	1100	**5000**
1955	0	200	1600	550	350	300	0	0	0	0	842	1100	**4942**
1956	0	200	1600	550	350	300	0	0	0	0	639	1100	**4739**
1957	0	200	1600	550	350	300	0	0	0	0	0	843	**3843**
1958	0	180	1600	550	350	300	0	0	0	0	900	1100	**4980**
1959	0	200	1600	550	350	300	0	0	0	0	842	1063	**4905**
1960	0	187	1600	550	350	203	0	0	0	0	900	1100	**4890**
1961	0	200	1600	550	350	300	0	0	0	0	668	293	**3961**
1962	0	140	1600	550	302	261	0	0	0	0	581	1100	**4534**
1963	0	193	1600	550	350	271	0	0	0	0	581	1100	**4645**
1964	0	200	1600	550	350	300	0	0	0	0	871	1100	**4971**
1965	0	200	1600	550	350	300	0	0	0	0	29	257	**3286**
1966	0	140	1497	550	350	271	0	0	0	0	842	1100	**4750**
1967	0	200	1600	550	350	300	0	0	0	0	900	1100	**5000**
1968	0	200	1600	550	350	300	0	0	0	0	319	1100	**4419**
1969	0	200	1600	550	350	300	0	0	0	0	900	1100	**5000**
1970	0	193	1600	550	350	300	0	0	0	0	406	293	**3693**
1971	0	193	1600	532	350	223	0	0	0	0	610	513	**4021**
1972	0	200	1548	550	350	281	0	0	0	0	900	917	**4746**
1973	0	200	1548	550	350	300	0	0	0	0	319	1100	**4368**
1974	0	200	1600	550	350	290	0	0	0	0	610	1100	**4700**
1975	0	200	1600	550	350	300	0	0	0	0	261	953	**4215**
1976	0	187	1548	550	350	300	0	0	0	0	726	1100	**4761**
1977	0	200	1600	550	350	300	0	0	0	0	900	1100	**5000**
1978	0	200	1600	550	350	300	0	0	0	0	697	1100	**4797**
1979	0	200	1600	550	350	300	0	0	0	0	494	1100	**4594**
1980	0	200	1600	550	350	300	0	0	0	0	871	990	**4861**
1981	0	200	1600	550	350	300	0	0	0	0	900	1027	**4927**
1982	0	200	1600	550	350	300	0	0	0	0	58	807	**3865**
1983	0	180	1600	550	350	300	0	0	0	0	0	587	**3567**
1984	0	47	877	550	350	300	0	0	0	0	0	0	**2124**
1985	0	13	723	337	350	271	0	0	0	0	465	1063	**3222**
1986	0	40	1032	550	229	145	0	0	0	0	290	440	**2727**
1987	0	7	1394	550	350	300	0	0	0	0	842	1100	**4542**
1988	0	200	1600	550	350	300	0	0	0	0	813	1100	**4913**
1989	0	200	1600	550	350	281	0	0	0	0	784	1100	**4865**
1990	0	200	1600	550	350	300	0	0	0	0	900	1100	**5000**
1991	0	200	1600	550	350	300	0	0	0	0	784	1063	**4847**
1992	0	200	1600	550	350	300	0	0	0	0	900	1100	**5000**
1993	0	200	1600	550	350	300	0	0	0	0	290	1100	**4390**
1994	0	200	1600	550	350	300	0	0	0	0	900	1100	**5000**
1995	0	200	1600	550	350	300	0	0	0	0	0	0	**3000**
1996	0	0	0	0	0	0	0	0	0	0	523	1100	**1623**
1997	0	160	1600	0	0	0	0	0	0	0	0	0	**1760**
1998	0	0	0	0	0	0	0	0	0	0	174	1100	**1274**
1999	0	200	1600	550	350	300	0	0	0	0	0	0	**3000**
2000	0	0	0	0	0	0	0	0	0	0	900	990	**1890**
2001	0	200	1600	550	350	300	0	0	0	0	900	1100	**5000**
2002	0	200	1600	550	350	300	0	0	0	0	900	1100	**5000**
2003	0	200	1600	550	350	300	0	0	0	0	900	1100	**5000**
Average	**0**	**172**	**1469**	**507**	**322**	**270**	**0**	**0**	**0**	**0**	**585**	**915**	**4240**

Attachment 3

Demand Scenario C

RESERVOIR RELEASES FOR HOMESTAKE 1 EXCHANGE

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	**Total**
1947	0	0	0	0	0	0	53	0	0	0	110	218	**381**
1948	339	4	0	0	0	0	24	0	0	837	174	0	**1377**
1949	0	0	0	0	0	0	0	0	0	0	240	134	**375**
1950	69	0	0	0	0	0	93	150	0	704	0	0	**1016**
1951	0	0	0	0	0	0	56	55	0	0	129	0	**240**
1952	0	0	0	0	0	0	0	0	0	0	0	21	**21**
1953	0	0	0	0	0	0	119	108	0	0	175	0	**402**
1954	0	0	0	0	0	0	417	442	4856	858	0	0	**6573**
1955	11	0	0	0	0	0	66	0	0	2857	1072	0	**4006**
1956	0	0	0	0	0	0	25	0	0	792	13	0	**830**
1957	0	0	0	0	0	0	5	0	0	0	0	23	**28**
1958	0	0	0	0	0	0	2	0	0	344	0	0	**347**
1959	0	0	0	0	0	0	10	0	0	848	136	0	**994**
1960	37	1	0	0	0	0	32	0	0	1370	409	0	**1849**
1961	0	0	0	0	0	0	19	97	351	1004	95	242	**1808**
1962	228	0	0	0	0	0	0	0	0	0	140	0	**368**
1963	0	0	0	0	0	0	139	0	1131	1057	667	336	**3330**
1964	0	0	0	0	0	0	4	41	0	2240	1143	0	**3427**
1965	0	0	0	0	0	0	0	0	0	0	53	67	**119**
1966	261	0	0	0	0	0	163	0	779	758	418	0	**2379**
1967	0	0	0	0	0	0	0	19	0	489	372	132	**1012**
1968	0	0	0	0	0	0	0	0	0	1239	399	430	**2068**
1969	0	0	0	0	0	0	7	0	0	382	86	0	**475**
1970	0	0	0	0	0	0	0	0	0	0	63	73	**136**
1971	432	0	0	0	0	0	0	0	0	0	976	57	**1465**
1972	0	0	0	0	0	0	0	0	0	679	47	43	**769**
1973	12	0	0	0	0	0	0	0	0	0	54	0	**66**
1974	0	0	0	0	0	0	5	0	0	0	0	0	**5**
1975	0	0	0	0	0	0	9	0	0	0	4	0	**13**
1976	0	0	0	0	0	0	0	0	0	275	100	62	**438**
1977	0	0	0	0	0	0	229	1268	1393	241	0	0	**3131**
1978	11	0	0	0	0	0	51	0	0	0	477	0	**539**
1979	0	0	0	0	0	0	0	0	0	0	257	0	**257**
1980	0	0	0	0	0	0	0	0	0	0	119	0	**119**
1981	0	0	0	0	0	0	358	782	445	614	1	4	**2204**
1982	0	0	0	0	0	0	0	0	0	0	78	152	**231**
1983	6	0	0	0	0	0	0	0	0	0	0	1	**7**
1984	0	0	0	0	0	0	16	0	0	0	0	0	**16**
1985	41	15	0	0	0	0	0	0	0	0	0	0	**57**
1986	182	24	0	0	0	0	0	0	0	0	0	0	**206**
1987	91	0	0	0	0	0	0	0	0	151	249	0	**491**
1988	0	0	0	0	0	0	0	0	0	0	6	0	**6**
1989	0	0	0	0	0	73	40	11	0	885	107	0	**1117**
1990	0	0	0	0	0	0	0	126	0	893	0	9	**1028**
1991	1	0	0	0	0	0	0	27	0	203	114	81	**426**
1992	0	0	0	0	0	0	0	0	0	551	263	78	**891**
1993	0	0	0	0	0	0	0	0	0	0	75	335	**410**
1994	0	0	0	0	0	0	0	0	283	900	37	120	**1341**
1995	0	0	0	0	0	0	0	91	0	0	0	0	**91**
1996	0	0	0	0	0	0	0	0	0	0	4	56	**61**
1997	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1998	0	0	0	0	0	0	0	0	0	0	251	171	**422**
1999	0	0	0	0	0	0	1	0	0	0	0	0	**1**
2000	0	0	0	0	0	0	0	0	0	187	50	120	**357**
2001	0	0	0	0	0	0	262	0	1075	1775	433	0	**3544**
2002	0	0	0	0	0	0	271	0	2437	13	0	8	**2729**
2003	4	0	0	0	0	0	0	0	0	1104	34	231	**1373**
Average	**30**	**1**	**0**	**0**	**0**	**1**	**43**	**56**	**224**	**425**	**169**	**56**	**1006**

Attachment 3

Demand Scenario C

RESERVOIR RELEASES FOR CAMP HALE EXCHANGE

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	**Total**
1947	1271	969	109	0	7	401	1203	0	0	0	505	971	**5435**
1948	2277	1033	347	8	116	483	685	0	0	979	1001	0	**6929**
1949	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1950	1921	1005	422	283	180	426	1356	611	0	1580	163	26	**7973**
1951	442	306	338	15	72	346	1085	295	0	0	693	8	**3600**
1952	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1953	353	124	147	63	198	283	878	810	0	0	569	0	**3424**
1954	37	11	3	3	1	0	2115	515	3454	1401	0	45	**7584**
1955	826	142	15	0	0	32	993	0	0	1960	1261	0	**5229**
1956	38	82	49	31	0	278	899	0	0	1086	162	0	**2626**
1957	0	10	0	0	0	0	414	0	0	0	0	485	**909**
1958	851	473	317	68	33	0	754	46	0	1041	0	0	**3584**
1959	42	4	0	0	0	0	673	0	0	1780	483	94	**3075**
1960	1584	563	1	1	0	0	228	0	0	1536	302	0	**4214**
1961	67	7	0	0	0	0	714	302	267	1523	434	560	**3873**
1962	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1963	480	5	0	0	0	101	1553	0	374	1058	582	761	**4914**
1964	185	51	0	0	0	0	810	428	0	1712	1378	31	**4596**
1965	60	0	0	0	0	0	210	0	0	0	97	428	**795**
1966	1661	412	196	25	0	139	2234	0	1370	2061	232	0	**8329**
1967	393	0	0	0	0	361	674	257	0	1141	667	445	**3939**
1968	577	139	0	0	0	24	381	11	0	1211	1031	509	**3882**
1969	1401	602	377	203	0	31	719	0	0	795	955	26	**5108**
1970	945	259	10	4	5	67	632	57	0	0	510	271	**2759**
1971	1901	1317	573	47	16	77	361	0	0	0	1439	23	**5755**
1972	319	27	108	64	60	369	700	98	0	1157	388	414	**3704**
1973	1071	577	97	0	0	0	592	0	0	0	496	140	**2974**
1974	452	214	2	0	0	68	671	0	0	0	355	0	**1762**
1975	292	41	3	0	0	0	212	60	0	0	307	189	**1105**
1976	241	43	0	0	0	0	946	0	0	854	894	231	**3210**
1977	471	0	0	0	0	0	1611	1853	1971	487	0	0	**6392**
1978	367	36	0	0	0	76	677	0	0	0	1302	19	**2478**
1979	230	3	0	0	0	0	141	0	0	0	698	0	**1071**
1980	154	0	0	0	0	0	155	0	0	0	502	16	**827**
1981	172	3	0	0	0	0	1206	1277	768	1487	113	70	**5096**
1982	519	147	0	0	6	12	509	0	0	0	137	882	**2212**
1983	1496	534	433	91	1	11	58	0	0	0	0	266	**2890**
1984	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1985	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1986	1174	160	302	69	26	178	0	0	0	0	34	354	**2297**
1987	1278	22	91	0	0	3	159	0	0	694	867	37	**3153**
1988	174	206	3	0	0	28	279	0	0	133	115	0	**937**
1989	38	6	0	0	0	470	705	124	0	2118	510	0	**3971**
1990	65	34	0	0	0	84	426	381	0	2090	40	35	**3155**
1991	886	314	0	0	0	1	892	341	0	425	730	255	**3843**
1992	168	424	45	0	0	0	163	0	0	1373	724	169	**3064**
1993	609	754	209	15	0	93	224	0	0	0	455	668	**3025**
1994	1038	524	54	0	0	17	53	0	529	2152	134	84	**4586**
1995	344	0	0	0	0	56	836	1068	0	0	0	0	**2303**
1996	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1997	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1998	0	0	0	0	0	0	0	0	0	0	241	242	**483**
1999	904	309	21	0	0	157	1012	0	0	0	0	0	**2404**
2000	0	0	0	0	0	0	156	0	0	820	607	296	**1879**
2001	473	333	137	0	0	67	2235	0	1436	4201	1012	24	**9917**
2002	29	9	0	0	0	6	3544	0	4785	216	2	51	**8642**
2003	675	375	0	0	0	0	44	0	0	2505	506	511	**4617**
Average	**543**	**221**	**77**	**17**	**13**	**83**	**663**	**150**	**262**	**729**	**415**	**169**	**3343**

Attachment 3

Demand Scenario C

RESERVOIR RELEASES FOR CFOPS

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	**Total**
1947	0	0	0	0	0	0	0	0	19835	0	0	0	**19835**
1948	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1949	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1950	0	0	0	0	0	0	0	0	19835	0	0	0	**19835**
1951	0	0	0	0	0	0	0	0	19835	0	0	0	**19835**
1952	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1953	0	0	0	0	0	0	0	7934	11901	0	0	0	**19835**
1954	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1955	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1956	0	0	0	0	0	0	0	19835	0	0	0	0	**19835**
1957	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1958	0	0	0	0	0	0	0	19835	0	0	0	0	**19835**
1959	0	0	0	0	0	0	0	0	19835	0	0	0	**19835**
1960	0	0	0	0	0	0	0	0	15868	0	0	0	**15868**
1961	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1962	0	0	0	0	0	0	0	19835	0	0	0	0	**19835**
1963	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1964	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1965	0	0	0	0	0	0	0	0	19835	0	0	0	**19835**
1966	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1967	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1968	0	0	0	0	0	0	0	0	19835	0	0	0	**19835**
1969	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1970	0	0	0	0	0	0	0	19835	0	0	0	0	**19835**
1971	0	0	0	0	0	0	0	0	19835	0	0	0	**19835**
1972	0	0	0	0	0	0	0	0	19835	0	0	0	**19835**
1973	0	0	0	0	0	0	0	0	19835	0	0	0	**19835**
1974	0	0	0	0	0	0	0	15868	3967	0	0	0	**19835**
1975	0	0	0	0	0	0	0	0	19835	0	0	0	**19835**
1976	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1977	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1978	0	0	0	0	0	0	0	0	19835	0	0	0	**19835**
1979	0	0	0	0	0	0	0	19835	0	0	0	0	**19835**
1980	0	0	0	0	0	0	0	0	19835	0	0	0	**19835**
1981	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1982	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1983	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1984	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1985	0	0	0	0	0	0	0	19835	0	0	0	0	**19835**
1986	0	0	0	0	0	0	0	19835	0	0	0	0	**19835**
1987	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1988	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1989	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1990	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1991	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1992	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1993	0	0	0	0	0	0	0	19835	0	0	0	0	**19835**
1994	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1995	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1996	0	0	0	0	0	0	0	19835	0	0	0	0	**19835**
1997	0	0	0	0	0	0	0	19835	0	0	0	0	**19835**
1998	0	0	0	0	0	0	0	5950	13884	0	0	0	**19835**
1999	0	0	0	0	0	0	0	0	19835	0	0	0	**19835**
2000	0	0	0	0	0	0	0	0	0	0	0	0	**0**
2001	0	0	0	0	0	0	0	0	0	0	0	0	**0**
2002	0	0	0	0	0	0	0	0	0	0	0	0	**0**
2003	0	0	0	0	0	0	0	9917	9917	0	0	0	**19835**
Average	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**4176**	**5498**	**0**	**0**	**0**	**9674**

Attachment 3

Demand Scenario C

TOTAL RESERVOIR RELEASES

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	**Total**
1947	5629	1169	1709	550	357	701	1255	0	19835	0	3097	6250	**40552**
1948	6974	1170	1947	558	466	783	708	0	0	1816	4324	5318	**24064**
1949	4358	200	1548	550	350	300	0	0	0	0	3187	5415	**15908**
1950	6348	1205	2022	833	530	726	1449	761	19835	2284	3313	5344	**44648**
1951	4800	506	1938	565	422	646	1141	350	19835	0	3391	5178	**38772**
1952	4358	200	1600	550	350	300	0	0	0	0	2249	5118	**14726**
1953	4711	317	1747	613	548	583	996	8852	11901	0	3575	5318	**39159**
1954	4395	211	1603	553	351	300	2531	957	8310	12259	8149	10363	**49982**
1955	5195	342	1615	550	350	332	1059	0	0	13817	11424	10318	**45002**
1956	4396	282	1649	581	350	578	924	19835	0	1878	3063	5318	**38855**
1957	4358	210	1600	550	350	300	418	0	0	0	2249	5569	**15605**
1958	5209	653	1917	618	383	300	757	19881	0	1385	3149	5318	**39571**
1959	4400	204	1600	550	350	300	683	0	19835	2628	3710	5374	**39635**
1960	5980	751	1601	551	350	203	260	0	15868	2906	3860	5318	**37646**
1961	4425	207	1600	550	350	300	733	400	618	12527	8446	10312	**40468**
1962	4586	140	1600	550	302	261	0	19835	0	0	2970	5318	**35562**
1963	4838	199	1600	550	350	372	1692	0	1505	12114	9080	11415	**43714**
1964	4543	251	1600	550	350	300	814	469	0	13952	10642	10349	**43819**
1965	4418	200	1600	550	350	300	210	0	19835	0	2428	4969	**34859**
1966	6279	552	1692	575	350	410	2397	0	2149	11819	10742	9318	**46283**
1967	4752	200	1600	550	350	661	674	276	0	1630	12189	12894	**35776**
1968	9935	339	1600	550	350	324	381	11	19835	2449	3999	6256	**46029**
1969	5759	802	1977	753	350	331	725	0	0	1177	4189	5343	**21407**
1970	5303	453	1610	554	355	367	632	19891	0	0	3229	4855	**37248**
1971	6692	1510	2173	579	366	300	361	0	19835	0	5274	4811	**41900**
1972	4677	227	1656	614	410	650	700	98	19835	1836	3584	5592	**39879**
1973	5441	777	1645	550	350	300	592	0	19835	0	3119	5458	**38067**
1974	4810	414	1602	550	350	359	676	15868	3967	0	3214	5318	**37126**
1975	4650	241	1603	550	350	300	222	60	19835	0	2821	5360	**35992**
1976	4599	230	1548	550	350	300	946	0	0	1129	3970	5611	**19234**
1977	4829	200	1600	550	350	300	1840	3121	3364	10727	8149	10318	**45348**
1978	4736	236	1600	550	350	376	728	0	19835	0	12726	12337	**53474**
1979	9588	203	1600	550	350	300	141	19835	0	0	3698	5318	**41582**
1980	4512	200	1600	550	350	300	155	0	19835	0	3741	5224	**36467**
1981	4530	203	1600	550	350	300	1564	2059	1213	8101	11263	11318	**43052**
1982	4877	347	1600	550	356	312	509	0	0	0	2522	6058	**17132**
1983	5861	714	2033	641	351	311	58	0	0	0	2249	5071	**17288**
1984	4358	47	877	550	350	300	16	0	0	0	2249	4218	**12965**
1985	4399	29	723	337	350	271	0	19835	0	0	2714	5281	**33938**
1986	5714	223	1335	619	255	323	0	19835	0	0	2573	5012	**35889**
1987	5727	29	1485	550	350	303	159	0	0	846	4207	5355	**19011**
1988	4532	406	1603	550	350	328	279	0	0	2133	6183	5318	**21681**
1989	4396	206	1600	550	350	824	745	135	0	8003	8651	5318	**30777**
1990	4423	234	1600	550	350	384	426	508	0	9982	12189	9361	**40008**
1991	5245	514	1600	550	350	301	892	368	0	627	13877	5617	**29941**
1992	4526	624	1645	550	350	300	163	0	0	6924	9136	5564	**29781**
1993	4967	954	1809	565	350	393	224	19835	0	0	3069	6320	**38484**
1994	5396	724	1654	550	350	317	53	0	813	7052	9320	15522	**41751**
1995	4702	200	1600	550	350	356	836	1160	0	0	2249	4218	**16220**
1996	4358	0	0	0	0	0	0	19835	0	0	2776	5374	**32343**
1997	4358	160	1600	0	0	0	0	19835	0	0	2249	4218	**32420**
1998	4358	0	0	0	0	0	0	5950	13884	0	2915	5730	**32838**
1999	5262	509	1621	550	350	457	1013	0	19835	0	2249	4218	**36065**
2000	4358	0	0	0	0	0	156	0	0	1007	3807	5623	**14951**
2001	4831	533	1737	550	350	367	2497	0	2511	8977	14594	10341	**47286**
2002	4387	209	1600	550	350	306	3815	0	7222	229	13152	15377	**47196**
2003	5037	575	1600	550	350	300	44	9917	9917	5608	6690	6060	**46650**
Average	**5107**	**394**	**1546**	**525**	**335**	**355**	**706**	**4382**	**5984**	**2944**	**5576**	**6814**	**34667**

ATTACHMENT 4

DIVERSIONS INTO STORAGE

Attachment 4

Demand Scenario B

Wolcott Inflow from Alkali Creek

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	**Total**
1947	0	0	0	0	0	0	556	4807	2083	715	460	122	**8742**
1948	62	236	0	0	0	0	1460	4277	404	189	0	0	**6628**
1949	0	0	10	0	0	0	795	3356	737	489	97	16	**5502**
1950	0	0	0	0	0	0	974	2092	1250	198	0	0	**4513**
1951	0	0	0	0	0	0	391	3897	1571	479	298	51	**6686**
1952	0	0	0	0	0	0	1632	2972	532	475	410	73	**6094**
1953	0	15	0	0	0	0	264	1710	1297	476	148	0	**3910**
1954	0	0	0	0	0	0	66	2033	18	0	0	0	**2118**
1955	0	0	0	0	0	0	459	3315	1262	74	10	0	**5120**
1956	0	0	0	0	0	0	704	5558	2235	312	43	0	**8852**
1957	0	0	0	0	0	0	321	3323	4993	1678	348	53	**10717**
1958	0	16	0	0	0	0	335	4438	532	184	0	0	**5505**
1959	0	0	0	0	0	0	243	3173	1303	218	20	13	**4969**
1960	22	10	0	0	0	67	1773	862	532	238	0	0	**3504**
1961	0	0	0	0	0	0	27	2570	1279	101	36	131	**4144**
1962	250	53	0	0	18	17	4122	1403	532	518	142	0	**7054**
1963	0	4	0	0	0	15	336	3268	635	47	45	0	**4350**
1964	0	0	0	0	0	0	27	2252	1470	174	19	0	**3943**
1965	0	0	0	0	0	0	663	4031	3483	888	163	124	**9353**
1966	44	44	9	0	0	16	186	3068	364	58	14	0	**3803**
1967	0	0	0	0	0	0	539	3089	1888	423	0	0	**5939**
1968	0	0	0	0	0	0	0	2159	2603	598	131	0	**5490**
1969	0	0	0	0	0	0	772	3514	1622	401	0	0	**6310**
1970	10	5	0	0	0	0	255	6794	532	493	120	102	**8311**
1971	53	5	0	4	0	44	824	415	532	509	47	74	**2507**
1972	0	0	4	0	0	8	754	1331	532	282	0	26	**2938**
1973	10	0	4	0	0	0	90	4050	1256	492	135	0	**6037**
1974	0	0	0	0	0	5	1120	5248	532	518	84	0	**7506**
1975	0	0	0	0	0	0	305	2595	2116	505	164	23	**5708**
1976	0	9	5	0	0	0	327	2644	532	377	35	0	**3928**
1977	0	0	0	0	0	0	0	845	278	53	0	0	**1176**
1978	0	0	0	0	0	0	931	6219	4574	861	61	0	**12646**
1979	0	0	0	0	0	0	911	6840	4572	925	122	0	**13370**
1980	0	0	0	0	0	0	731	3855	532	509	6	16	**5648**
1981	0	0	0	0	0	0	33	964	778	119	0	9	**1903**
1982	0	0	0	0	0	0	232	4279	4108	904	242	81	**9847**
1983	0	18	0	0	0	0	180	2855	532	518	421	94	**4617**
1984	0	101	29	0	0	0	211	412	532	518	404	287	**2495**
1985	258	14	27	20	0	94	251	415	532	475	118	3	**2206**
1986	91	198	90	0	68	88	252	415	532	502	186	141	**2562**
1987	117	68	8	0	0	0	628	415	532	279	16	0	**2064**
1988	0	0	0	0	0	0	1463	3497	532	398	9	0	**5899**
1989	0	0	0	0	0	97	1448	2519	673	181	21	0	**4939**
1990	0	0	0	0	0	0	640	1628	1085	200	0	0	**3552**
1991	0	0	0	0	0	0	79	3442	2573	469	50	4	**6616**
1992	0	0	0	0	0	0	609	1986	635	171	0	0	**3401**
1993	0	0	0	0	0	0	292	4424	3012	571	138	0	**8436**
1994	0	0	0	0	0	0	846	3145	458	0	0	0	**4449**
1995	0	0	0	0	0	0	0	1205	1363	357	343	486	**3753**
1996	446	0	0	0	0	83	252	415	532	445	109	0	**2282**
1997	131	30	0	91	0	83	252	415	532	518	492	729	**3272**
1998	609	0	0	0	0	83	252	415	532	514	239	0	**2644**
1999	0	0	0	0	0	0	371	3268	911	517	327	137	**5532**
2000	79	0	0	0	0	83	204	415	532	287	0	12	**1613**
2001	0	0	0	0	0	0	79	3176	790	0	0	0	**4044**
2002	0	0	0	0	0	0	0	810	74	0	0	0	**885**
2003	0	0	0	0	0	0	539	2874	1446	165	0	0	**5023**
Average	**38**	**15**	**3**	**2**	**1**	**14**	**561**	**2726**	**1260**	**396**	**110**	**49**	**5176**

Attachment 4

Demand Scenario B

Wolcott Inflow from Eagle Pump and Pipeline

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	**Total**
1947	0	0	0	0	0	0	2668	9223	8926	9223	6843	2083	**38965**
1948	893	2975	0	0	0	0	5950	7103	128	1502	0	0	**18552**
1949	0	0	286	0	0	0	3273	9223	508	28	174	298	**13790**
1950	0	0	0	0	0	0	4760	8033	3204	527	0	0	**16525**
1951	0	0	0	0	0	0	2380	8331	4760	39	2314	1136	**18960**
1952	0	0	0	0	0	0	5355	3165	0	42	2253	1154	**11969**
1953	0	298	0	0	0	0	1190	6162	4108	41	212	0	**12011**
1954	0	0	0	0	0	0	541	6843	595	0	0	0	**7979**
1955	0	0	0	0	0	0	3868	9223	8926	1190	595	0	**23802**
1956	0	0	0	0	0	0	5058	9223	8926	4122	2105	0	**29433**
1957	0	0	0	0	0	0	2975	9223	8926	9223	9223	2083	**41653**
1958	0	893	0	0	0	0	2083	6248	0	0	0	0	**9223**
1959	0	0	0	0	0	0	1785	9223	3496	1141	505	175	**16325**
1960	893	595	0	0	0	2975	7736	2943	0	298	0	0	**15439**
1961	0	0	0	0	0	0	298	8006	8331	1868	2143	6545	**27190**
1962	8033	2678	0	0	1190	1190	8033	1978	0	0	298	0	**23400**
1963	0	298	0	0	0	893	2659	8652	1683	893	2942	0	**18018**
1964	0	0	0	0	0	0	298	6180	8926	2975	298	0	**18676**
1965	0	0	0	0	0	0	3273	9223	8926	9223	8926	6843	**46413**
1966	2380	2678	595	0	0	893	1785	8628	26	1437	476	0	**18897**
1967	0	0	0	0	0	0	6248	8175	8926	6545	0	0	**29894**
1968	0	0	0	0	0	0	0	8926	8926	6843	5950	0	**30645**
1969	0	0	0	0	0	0	5355	9223	7610	163	0	0	**22351**
1970	595	298	0	0	0	0	2663	8504	0	25	1746	5991	**19821**
1971	2766	298	0	264	0	2380	3230	0	0	9	1812	4741	**15501**
1972	0	0	298	0	0	595	5058	4200	0	18	0	1488	**11656**
1973	595	0	298	0	0	0	849	8998	2209	26	1433	0	**14407**
1974	0	0	0	0	0	298	2975	6633	0	0	196	0	**10102**
1975	0	0	0	0	0	0	1785	7351	3570	13	1502	1107	**15328**
1976	0	574	298	0	0	0	2678	8063	0	430	379	0	**12421**
1977	0	0	0	0	0	0	0	4463	4760	772	0	0	**9995**
1978	0	0	0	0	0	0	6843	9223	8926	9223	2083	0	**36298**
1979	0	0	0	0	0	0	4463	9223	8926	4462	1686	0	**28759**
1980	0	0	0	0	0	0	2975	8397	0	9	298	893	**12571**
1981	0	0	0	0	0	0	298	4463	7736	2083	0	595	**15174**
1982	0	0	0	0	0	0	2083	9223	8926	9223	4967	2380	**36802**
1983	0	893	0	0	0	0	1488	7424	0	0	2242	2717	**14763**
1984	0	6843	798	0	0	0	1442	19	0	0	2259	4270	**15631**
1985	4355	14	540	419	0	607	45	0	0	43	82	298	**6404**
1986	3273	7140	3273	0	1336	194	0	0	0	16	2840	4146	**22217**
1987	3241	2344	240	0	0	0	2364	0	0	470	10	0	**8669**
1988	0	0	0	0	0	0	6241	6903	0	1784	581	0	**15510**
1989	0	0	0	0	0	483	5355	8926	1443	3320	1125	0	**20652**
1990	0	0	0	0	0	0	3868	7543	8926	2975	0	0	**23312**
1991	0	0	0	0	0	0	893	7294	8926	8628	1190	298	**27227**
1992	0	0	0	0	0	0	5058	9223	8926	4165	0	0	**27372**
1993	0	0	0	0	0	0	2917	9223	8926	3728	986	0	**25780**
1994	0	0	0	0	0	0	3570	9223	363	0	0	0	**13156**
1995	0	0	0	0	0	0	0	5950	8926	9223	9223	7350	**40672**
1996	7537	0	0	0	0	0	0	0	0	73	65	0	**7674**
1997	8960	1780	0	3993	0	1	0	0	0	0	2171	3828	**20733**
1998	3965	0	0	0	0	0	0	0	0	4	1500	0	**5469**
1999	0	0	0	0	0	0	2380	9223	793	1	2336	4416	**19149**
2000	4494	0	0	0	0	0	191	0	0	30	0	729	**5445**
2001	0	0	0	0	0	0	298	9223	6870	0	0	0	**16391**
2002	0	0	0	0	0	0	0	9223	1190	0	0	0	**10413**
2003	0	0	0	0	0	0	5917	9223	8926	2678	0	0	**26743**
Average	**912**	**537**	**116**	**82**	**44**	**184**	**2728**	**6500**	**3774**	**2118**	**1543**	**1150**	**19690**

Attachment 4

Demand Scenario B

Total Wolcott Inflow

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	**Total**
1947	0	0	0	0	0	0	3224	14030	11009	9938	7303	2204	**47708**
1948	954	3212	0	0	0	0	7410	11380	532	1691	0	0	**25179**
1949	0	0	296	0	0	0	4068	12579	1246	518	271	314	**19291**
1950	0	0	0	0	0	0	5734	10125	4454	725	0	0	**21038**
1951	0	0	0	0	0	0	2771	12228	6331	518	2611	1187	**25646**
1952	0	0	0	0	0	0	6988	6136	532	518	2663	1227	**18064**
1953	0	313	0	0	0	0	1454	7871	5405	518	360	0	**15921**
1954	0	0	0	0	0	0	607	8876	614	0	0	0	**10097**
1955	0	0	0	0	0	0	4326	12538	10187	1264	605	0	**28921**
1956	0	0	0	0	0	0	5761	14781	11161	4434	2148	0	**38285**
1957	0	0	0	0	0	0	3296	12546	13919	10902	9571	2135	**52370**
1958	0	908	0	0	0	0	2418	10686	532	184	0	0	**14728**
1959	0	0	0	0	0	0	2028	12396	4799	1359	525	188	**21294**
1960	914	605	0	0	0	3042	9508	3805	532	536	0	0	**18943**
1961	0	0	0	0	0	0	325	10576	9609	1969	2179	6676	**31334**
1962	8283	2731	0	0	1208	1207	12155	3381	532	518	440	0	**30455**
1963	0	301	0	0	0	908	2995	11920	2318	940	2986	0	**22368**
1964	0	0	0	0	0	0	325	8432	10396	3150	316	0	**22618**
1965	0	0	0	0	0	0	3936	13254	12409	10112	9089	6967	**55766**
1966	2425	2722	604	0	0	908	1971	11696	390	1494	490	0	**22700**
1967	0	0	0	0	0	0	6787	11264	10814	6968	0	0	**35833**
1968	0	0	0	0	0	0	0	11084	11528	7441	6081	0	**36135**
1969	0	0	0	0	0	0	6128	12737	9232	564	0	0	**28660**
1970	606	302	0	0	0	0	2918	15297	532	518	1866	6093	**28132**
1971	2819	302	0	268	0	2424	4054	415	532	518	1860	4816	**18007**
1972	0	0	302	0	0	603	5812	5531	532	301	0	1513	**14594**
1973	605	0	302	0	0	0	939	13048	3466	518	1568	0	**20445**
1974	0	0	0	0	0	302	4095	11881	532	518	280	0	**17608**
1975	0	0	0	0	0	0	2090	9946	5686	518	1666	1130	**21036**
1976	0	584	302	0	0	0	3004	10706	532	806	414	0	**16349**
1977	0	0	0	0	0	0	0	5308	5038	825	0	0	**11171**
1978	0	0	0	0	0	0	7774	15442	13500	10085	2143	0	**48944**
1979	0	0	0	0	0	0	5374	16064	13498	5386	1808	0	**42130**
1980	0	0	0	0	0	0	3706	12252	532	518	303	908	**18219**
1981	0	0	0	0	0	0	331	5427	8514	2202	0	604	**17077**
1982	0	0	0	0	0	0	2315	13502	13034	10127	5209	2461	**46648**
1983	0	911	0	0	0	0	1667	10279	532	518	2663	2810	**19380**
1984	0	6944	827	0	0	0	1653	431	532	518	2663	4557	**18126**
1985	4613	29	568	439	0	701	297	415	532	518	200	300	**8610**
1986	3364	7339	3362	0	1403	282	252	415	532	518	3026	4287	**24779**
1987	3358	2412	248	0	0	0	2992	415	532	749	27	0	**10732**
1988	0	0	0	0	0	0	7704	10400	532	2183	590	0	**21409**
1989	0	0	0	0	0	580	6804	11445	2116	3501	1146	0	**25591**
1990	0	0	0	0	0	0	4508	9171	10010	3176	0	0	**26864**
1991	0	0	0	0	0	0	972	10735	11499	9097	1240	301	**33843**
1992	0	0	0	0	0	0	5667	11209	9560	4336	0	0	**30773**
1993	0	0	0	0	0	0	3209	13647	11937	4298	1124	0	**34216**
1994	0	0	0	0	0	0	4416	12368	821	0	0	0	**17606**
1995	0	0	0	0	0	0	0	7156	10289	9580	9566	7836	**44426**
1996	7983	0	0	0	0	83	252	415	532	518	173	0	**9956**
1997	9091	1810	0	4085	0	83	252	415	532	518	2663	4557	**24006**
1998	4574	0	0	0	0	83	252	415	532	518	1739	0	**8113**
1999	0	0	0	0	0	0	2752	12492	1705	518	2663	4553	**24681**
2000	4574	0	0	0	0	83	395	415	532	317	0	742	**7057**
2001	0	0	0	0	0	0	376	12399	7660	0	0	0	**20435**
2002	0	0	0	0	0	0	0	10034	1265	0	0	0	**11298**
2003	0	0	0	0	0	0	6455	12097	10371	2843	0	0	**31766**
Average	**950**	**551**	**119**	**84**	**46**	**198**	**3289**	**9226**	**5034**	**2514**	**1653**	**1199**	**24866**

Attachment 4

Demand Scenario C

Wolcott Inflow from Alkali Creek

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	**Total**
1947	0	0	0	0	0	0	556	4807	1420	715	460	122	**8079**
1948	62	236	0	0	0	0	1460	4933	614	190	0	0	**7495**
1949	0	0	10	0	0	0	795	2861	532	489	97	16	**4802**
1950	0	0	0	0	0	0	974	2092	947	214	0	0	**4227**
1951	0	0	0	0	0	0	391	3897	1461	610	439	51	**6848**
1952	0	0	0	0	0	0	1632	4545	532	475	410	73	**7668**
1953	0	15	0	0	0	0	264	1208	1192	734	337	0	**3751**
1954	0	0	0	0	0	0	66	2033	18	0	0	0	**2118**
1955	0	0	0	0	0	0	459	3315	1262	74	10	0	**5120**
1956	0	0	0	0	0	0	704	2740	2235	312	43	0	**6033**
1957	0	0	0	0	0	0	321	3323	4993	1678	348	53	**10717**
1958	0	16	0	0	0	0	335	3267	1723	241	0	0	**5582**
1959	0	0	0	0	0	0	243	3173	1108	291	20	13	**4848**
1960	22	10	0	0	0	67	1773	3698	1488	356	0	0	**7412**
1961	0	0	0	0	0	0	27	2570	1279	101	36	131	**4144**
1962	250	53	0	0	18	17	4122	3118	2812	518	142	0	**11050**
1963	0	4	0	0	0	15	336	3268	508	47	45	0	**4223**
1964	0	0	0	0	0	0	27	2252	1470	174	19	0	**3943**
1965	0	0	0	0	0	0	663	4031	2075	888	163	124	**7945**
1966	44	44	9	0	0	16	186	3242	593	58	14	0	**4205**
1967	0	0	0	0	0	0	539	3089	1888	423	0	0	**5939**
1968	0	0	0	0	0	0	0	2159	1883	598	131	0	**4771**
1969	0	0	0	0	0	0	772	3514	1865	573	0	0	**6724**
1970	10	5	0	0	0	0	255	3339	3133	623	120	102	**7588**
1971	53	5	0	4	0	44	920	415	886	718	47	74	**3167**
1972	0	0	4	0	0	8	754	1491	1206	312	0	26	**3801**
1973	10	0	4	0	0	0	90	4050	1629	641	135	0	**6560**
1974	0	0	0	0	0	5	1120	5169	2306	650	84	0	**9333**
1975	0	0	0	0	0	0	305	2595	2271	944	164	23	**6302**
1976	0	9	5	0	0	0	327	2148	532	377	35	0	**3433**
1977	0	0	0	0	0	0	0	845	278	53	0	0	**1176**
1978	0	0	0	0	0	0	931	6219	2801	861	61	0	**10873**
1979	0	0	0	0	0	0	911	2381	4572	977	122	0	**8963**
1980	0	0	0	0	0	0	731	4219	1439	643	6	16	**7053**
1981	0	0	0	0	0	0	33	964	778	119	0	9	**1903**
1982	0	0	0	0	0	0	232	4279	4108	904	242	81	**9847**
1983	0	18	0	0	0	0	180	3496	1328	518	421	94	**6055**
1984	0	86	18	0	0	0	199	415	532	518	404	287	**2460**
1985	258	14	27	20	0	74	252	3633	1922	475	118	3	**6796**
1986	91	198	41	0	57	102	252	281	2591	769	186	141	**4708**
1987	117	68	8	0	0	0	566	415	532	279	16	0	**2002**
1988	0	0	0	0	0	0	1463	2632	532	398	9	0	**5035**
1989	0	0	0	0	0	97	1448	2463	509	181	21	0	**4720**
1990	0	0	0	0	0	0	640	1628	1082	200	0	0	**3550**
1991	0	0	0	0	0	0	79	3442	2573	469	50	4	**6616**
1992	0	0	0	0	0	0	609	1986	633	171	0	0	**3399**
1993	0	0	0	0	0	0	292	2428	3012	581	138	0	**6450**
1994	0	0	0	0	0	0	846	3145	458	0	0	0	**4449**
1995	0	0	0	0	0	0	0	1205	1363	357	343	486	**3753**
1996	446	0	0	0	0	83	252	1755	2645	487	109	0	**5777**
1997	131	30	0	61	0	83	252	2637	4222	518	492	729	**9155**
1998	609	0	0	0	0	83	252	374	976	690	239	0	**3224**
1999	0	0	0	0	0	0	371	3116	1062	788	327	137	**5801**
2000	79	0	0	0	0	83	204	415	532	287	0	12	**1613**
2001	0	0	0	0	0	0	79	3176	780	0	0	0	**4034**
2002	0	0	0	0	0	0	0	810	74	0	0	0	**885**
2003	0	0	0	0	0	0	539	2055	905	165	0	0	**3664**
Average	**38**	**14**	**2**	**1**	**1**	**14**	**562**	**2680**	**1546**	**446**	**116**	**49**	**5470**

Attachment 4

Demand Scenario C

Wolcott Inflow from Eagle Pump and Pipeline

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	**Total**
1947	0	0	0	0	0	0	3179	12298	7934	12298	9124	2662	**47494**
1948	1190	3559	0	0	0	0	7559	12298	11901	6527	0	0	**43033**
1949	0	0	292	0	0	0	4364	10314	0	28	177	397	**15572**
1950	0	0	0	0	0	0	6221	10711	7934	5950	0	0	**30816**
1951	0	0	0	0	0	0	3128	11106	7934	12298	6939	1014	**42418**
1952	0	0	0	0	0	0	7140	7972	0	42	2253	1217	**18624**
1953	0	344	0	0	0	0	1374	5832	9521	12195	3682	0	**32947**
1954	0	0	0	0	0	0	584	9124	793	0	0	0	**10502**
1955	0	0	0	0	0	0	4930	12298	11901	1587	638	0	**31353**
1956	0	0	0	0	0	0	6597	8331	11901	4633	2168	0	**33630**
1957	0	0	0	0	0	0	3761	12268	11901	12298	12298	2749	**55274**
1958	0	1169	0	0	0	0	2521	7758	11901	4364	0	0	**27712**
1959	0	0	0	0	0	0	2246	12267	7934	4866	551	138	**28001**
1960	1190	793	0	0	0	3905	10221	12219	8727	5554	0	0	**42609**
1961	0	0	0	0	0	0	273	10261	11107	1589	1984	8727	**33942**
1962	10711	3570	0	0	1555	1574	10674	6602	8600	0	398	0	**43683**
1963	0	352	0	0	0	798	2584	11186	430	1112	3309	0	**19772**
1964	0	0	0	0	0	0	262	7776	11901	3967	397	0	**24302**
1965	0	0	0	0	0	0	4278	12298	7934	12298	11901	8828	**57537**
1966	3174	3053	725	0	0	934	2282	12298	6930	1420	509	0	**31324**
1967	0	0	0	0	0	0	7065	9514	11901	8727	0	0	**37208**
1968	0	0	0	0	0	0	0	11891	7934	9124	7934	0	**36883**
1969	0	0	0	0	0	0	7140	12298	11901	9487	0	0	**40826**
1970	793	397	0	0	0	0	2901	7677	11901	11300	1990	6396	**43354**
1971	3202	379	0	241	0	3130	4784	0	2777	12298	3657	5725	**36192**
1972	0	0	338	0	0	565	6644	5709	7934	7140	0	1937	**30268**
1973	793	0	307	0	0	0	775	10953	7934	12298	7228	0	**40288**
1974	0	0	0	0	0	341	3725	9124	11107	4962	355	0	**29615**
1975	0	0	0	0	0	0	2217	9046	7934	12298	2613	944	**35052**
1976	0	593	305	0	0	0	3313	8981	0	715	1004	0	**14911**
1977	0	0	0	0	0	0	0	5806	6037	930	0	0	**12773**
1978	0	0	0	0	0	0	8998	12126	7934	12298	2732	0	**44087**
1979	0	0	0	0	0	0	5950	8331	11901	12298	5554	0	**44033**
1980	0	0	0	0	0	0	3967	12298	7934	12204	266	979	**37647**
1981	0	0	0	0	0	0	397	5824	10314	2772	0	496	**19804**
1982	0	0	0	0	0	0	2777	12298	11901	12298	11251	3124	**53647**
1983	0	1083	0	0	0	0	1834	10619	894	0	2242	2514	**19186**
1984	0	7338	704	0	0	0	1482	25	0	0	2259	4270	**16078**
1985	4357	14	540	419	0	634	49	7537	7674	43	82	397	**21748**
1986	4364	9508	1043	0	1207	305	0	0	11901	5738	2801	4768	**41635**
1987	3353	2877	260	0	0	0	2349	0	0	1084	10	0	**9933**
1988	0	0	0	0	0	0	8114	7069	0	1706	439	0	**17328**
1989	0	0	0	0	0	357	6725	10995	23	4080	1177	0	**23357**
1990	0	0	0	0	0	0	4508	9683	10089	3566	0	0	**27847**
1991	0	0	0	0	0	0	810	9451	11901	11458	1419	315	**35354**
1992	0	0	0	0	0	0	6531	12298	6903	2321	0	0	**28052**
1993	0	0	0	0	0	0	3551	8331	11901	12298	7857	0	**43936**
1994	0	0	0	0	0	0	4760	11980	229	0	0	0	**16969**
1995	0	0	0	0	0	0	0	7934	11901	12298	12264	4374	**48770**
1996	4127	0	0	0	0	0	0	3570	11901	927	65	0	**20590**
1997	10249	1967	0	2626	0	1	0	3967	9942	0	2171	3828	**34750**
1998	3965	0	0	0	0	0	0	0	9124	10110	1500	0	**24699**
1999	0	0	0	0	0	0	3151	11717	7140	11869	2336	4420	**40634**
2000	4494	0	0	0	0	0	205	0	0	30	0	573	**5303**
2001	0	0	0	0	0	0	397	12298	7919	0	0	0	**20614**
2002	0	0	0	0	0	0	0	12147	1587	0	0	0	**13734**
2003	0	0	0	0	0	0	7072	9767	9917	3570	0	0	**30327**
Average	**982**	**649**	**79**	**58**	**48**	**220**	**3445**	**8710**	**7464**	**5706**	**2413**	**1242**	**31017**

Attachment 4

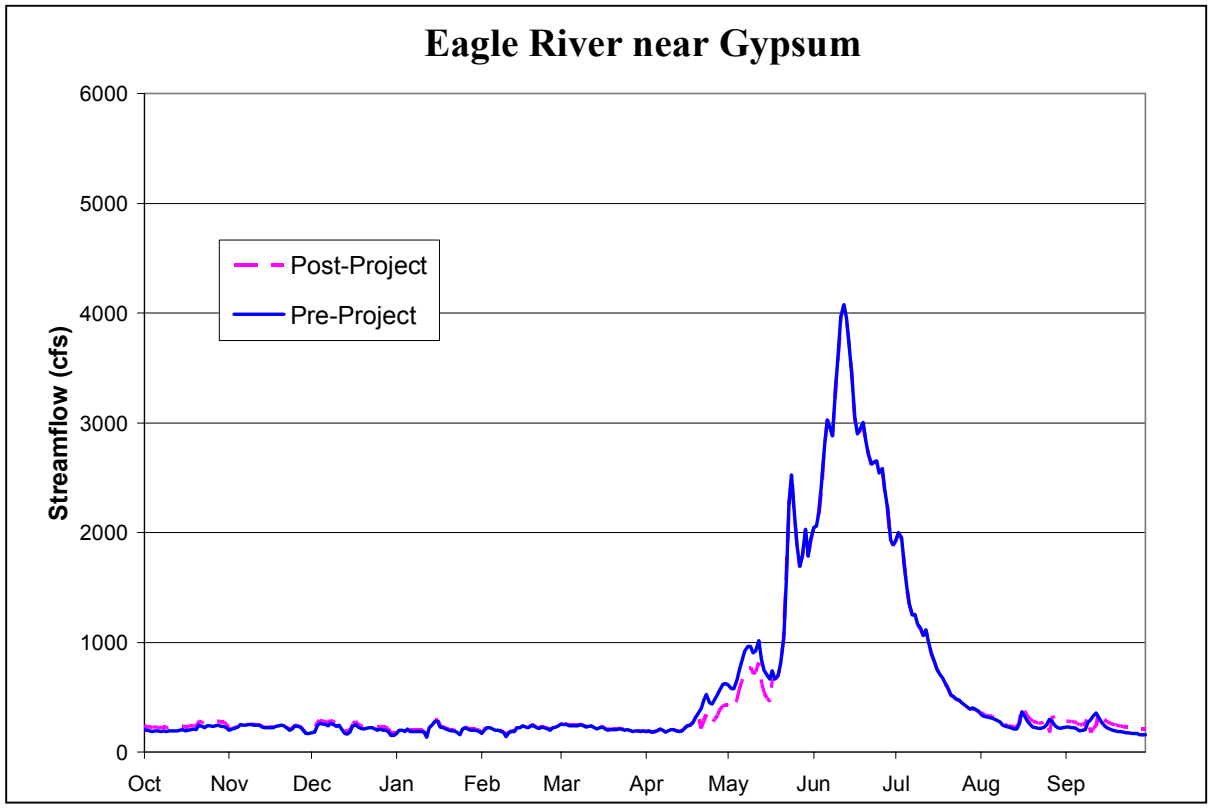
Demand Scenario C

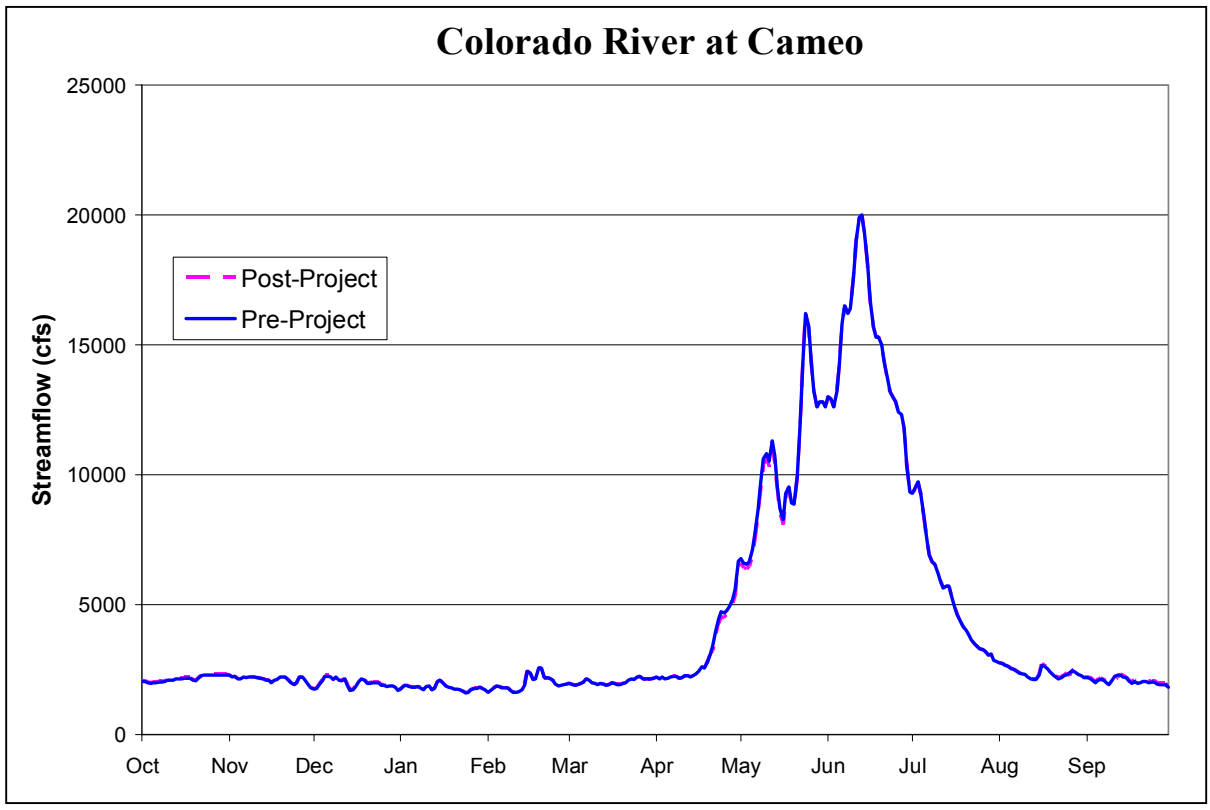
Total Wolcott Inflow

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	**Total**
1947	0	0	0	0	0	0	3736	17104	9353	13012	9584	2784	**55573**
1948	1252	3796	0	0	0	0	9018	17231	12515	6717	0	0	**50528**
1949	0	0	302	0	0	0	5159	13175	532	518	274	413	**20373**
1950	0	0	0	0	0	0	7195	12803	8881	6165	0	0	**35043**
1951	0	0	0	0	0	0	3519	15003	9394	12907	7378	1065	**49266**
1952	0	0	0	0	0	0	8773	12517	532	518	2663	1289	**26292**
1953	0	359	0	0	0	0	1638	7040	10713	12928	4019	0	**36698**
1954	0	0	0	0	0	0	650	11157	812	0	0	0	**12619**
1955	0	0	0	0	0	0	5388	15613	13162	1661	648	0	**36472**
1956	0	0	0	0	0	0	7301	11070	14136	4945	2211	0	**39663**
1957	0	0	0	0	0	0	4082	15591	16894	13976	12646	2801	**65990**
1958	0	1185	0	0	0	0	2856	11025	13624	4605	0	0	**33294**
1959	0	0	0	0	0	0	2488	15440	9042	5157	571	150	**32849**
1960	1212	803	0	0	0	3972	11994	15917	10215	5909	0	0	**50021**
1961	0	0	0	0	0	0	300	12831	12386	1690	2020	8858	**38085**
1962	10961	3624	0	0	1572	1590	14796	9720	11412	518	539	0	**54732**
1963	0	356	0	0	0	814	2920	14455	938	1159	3354	0	**23995**
1964	0	0	0	0	0	0	289	10027	13371	4141	416	0	**28244**
1965	0	0	0	0	0	0	4941	16328	10009	13186	12064	8953	**65481**
1966	3218	3098	733	0	0	949	2468	15539	7523	1478	523	0	**35530**
1967	0	0	0	0	0	0	7604	12604	13789	9150	0	0	**43147**
1968	0	0	0	0	0	0	0	14050	9817	9722	8065	0	**41653**
1969	0	0	0	0	0	0	7913	15811	13766	10061	0	0	**47550**
1970	804	402	0	0	0	0	3156	11016	15034	11923	2110	6498	**50942**
1971	3256	384	0	245	0	3173	5704	415	3663	13016	3705	5799	**39359**
1972	0	0	343	0	0	573	7398	7200	9140	7452	0	1963	**34069**
1973	803	0	311	0	0	0	865	15003	9563	12939	7363	0	**46848**
1974	0	0	0	0	0	345	4845	14293	13413	5612	439	0	**38947**
1975	0	0	0	0	0	0	2522	11641	10205	13242	2777	967	**41354**
1976	0	602	310	0	0	0	3639	11130	532	1091	1039	0	**18344**
1977	0	0	0	0	0	0	0	6651	6315	983	0	0	**13949**
1978	0	0	0	0	0	0	9929	18345	10734	13159	2793	0	**54960**
1979	0	0	0	0	0	0	6861	10711	16473	13274	5676	0	**52996**
1980	0	0	0	0	0	0	4698	16517	9373	12847	271	995	**44701**
1981	0	0	0	0	0	0	430	6789	11092	2892	0	505	**21707**
1982	0	0	0	0	0	0	3009	16577	16009	13202	11493	3205	**63494**
1983	0	1101	0	0	0	0	2014	14115	2223	518	2663	2607	**25240**
1984	0	7424	723	0	0	0	1681	440	532	518	2663	4557	**18538**
1985	4615	29	568	439	0	708	302	11171	9596	518	200	399	**28544**
1986	4455	9706	1085	0	1264	407	252	281	14491	6507	2987	4908	**46343**
1987	3470	2945	268	0	0	0	2915	415	532	1363	27	0	**11935**
1988	0	0	0	0	0	0	9578	9701	532	2104	447	0	**22362**
1989	0	0	0	0	0	454	8173	13458	532	4261	1198	0	**28077**
1990	0	0	0	0	0	0	5148	11311	11172	3767	0	0	**31397**
1991	0	0	0	0	0	0	889	12893	14474	11927	1468	318	**41970**
1992	0	0	0	0	0	0	7140	14284	7536	2492	0	0	**31451**
1993	0	0	0	0	0	0	3843	10758	14912	12878	7995	0	**50387**
1994	0	0	0	0	0	0	5606	15125	687	0	0	0	**21418**
1995	0	0	0	0	0	0	0	9139	13264	12654	12606	4860	**52523**
1996	4574	0	0	0	0	83	252	5325	14546	1414	173	0	**26367**
1997	10380	1997	0	2687	0	83	252	6604	14164	518	2663	4557	**43905**
1998	4574	0	0	0	0	83	252	374	10100	10800	1739	0	**27923**
1999	0	0	0	0	0	0	3523	14833	8202	12658	2663	4557	**46435**
2000	4574	0	0	0	0	83	409	415	532	317	0	585	**6915**
2001	0	0	0	0	0	0	475	15473	8699	0	0	0	**24647**
2002	0	0	0	0	0	0	0	12957	1661	0	0	0	**14619**
2003	0	0	0	0	0	0	7611	11822	10823	3735	0	0	**33991**
Average	**1020**	**663**	**81**	**59**	**50**	**234**	**4007**	**11390**	**9010**	**6153**	**2529**	**1291**	**36487**

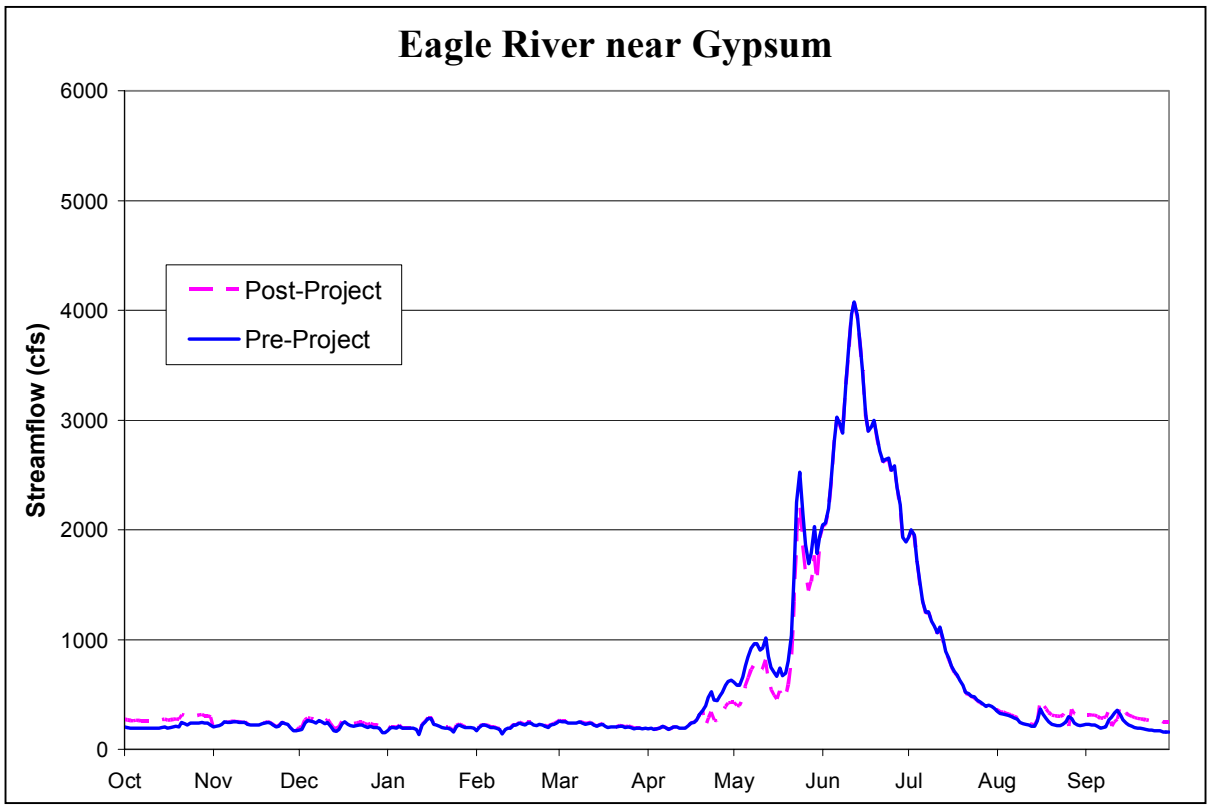
ATTACHMENT 5
STREAM FLOW HYDROGRAPHS

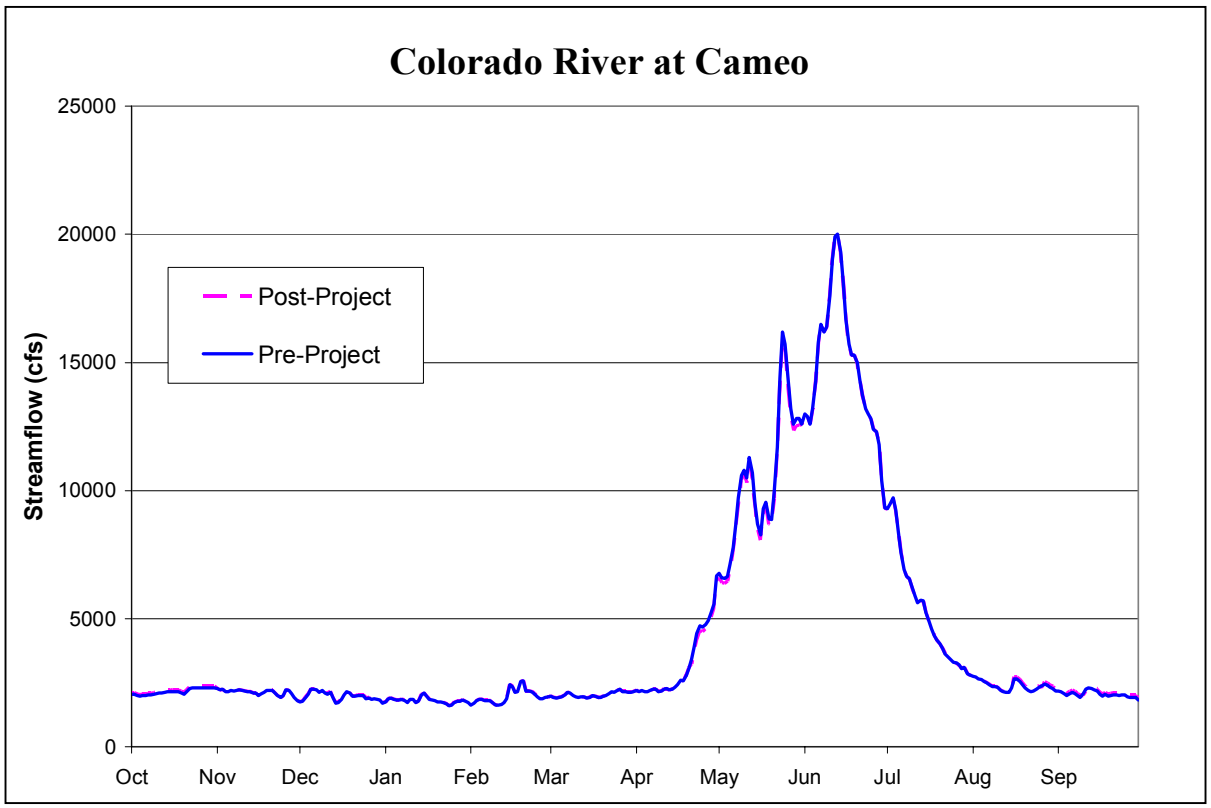
Scenario A
Average Water Year (1980)



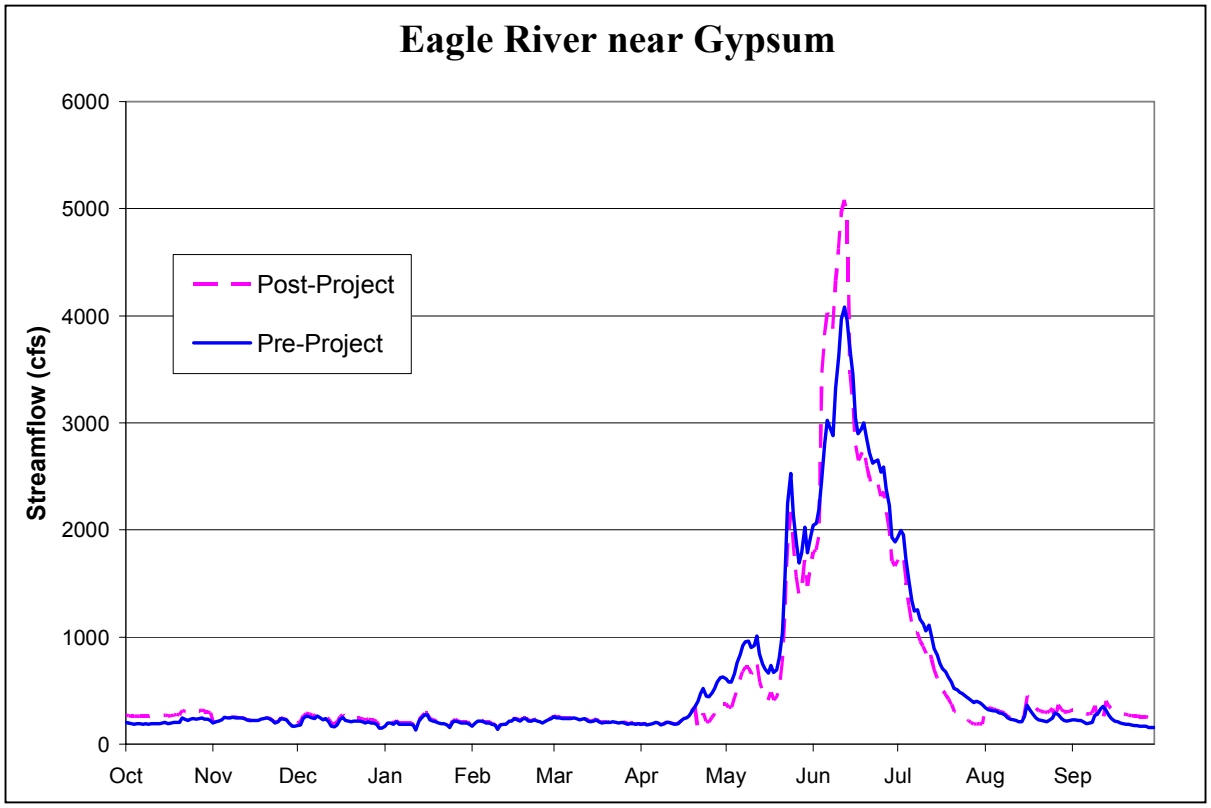


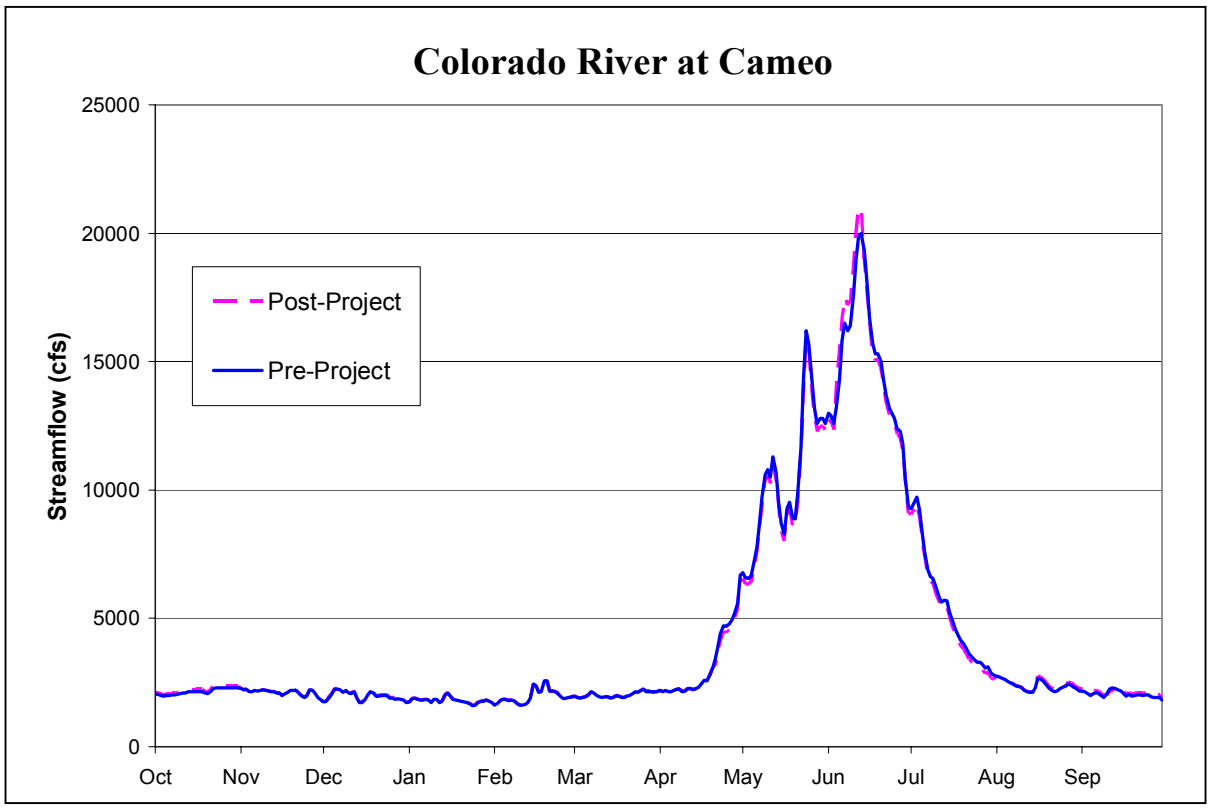
Scenario B
Average Water Year (1980)





Scenario C
Average Water Year (1980)





ATTACHMENT 6

COST ESTIMATING PROCEDURES

Wolcott Dam and Reservoir
Pump and Pipeline Sizing Spreadsheet
Project No. 04045

Alternative
ID: **LWR 45 -- 150CFS**
Description: **Lower Wolcott Site**

Legend

Inputs
Calculated or Set Values
Assumed Values
Values Requiring Adjustment
Reference Information

Assumptions:
1. Pipeline will consist of high-pressure steel pipe.
2. Assume minor losses are equal to 20% of friction losses.
3. Hazen-Williams Formula for pipe friction loss calculation.
4. Pump efficiency is approximately 85%
5. Pipe pressure class limitations and number of pumping stations not considered at this screening level.

Analysis:

Alignment Information

Pipeline Elev. No. 1 (From):	**6920**	ft-m.s.l.	Starting Point (From):	Eagle River
Pipeline Elev. No. 2 (To):	**7259**	ft-m.s.l.	End Point (To):	Lower Wolcott Site
Pipeline Length, L =	**1.14**	miles		
Misc. Head:	**0**	ft-m.s.l.		
Total delta h =	339			

Design Inputs

Peak Discharge, Q_{peak} =	**150.0**	cfs	--->	Velocity based on one of the following conditions:
Average Discharge, Q_{avg} =	**150.0**	cfs		Average Flow Velocity = 10 fps
Acceleration of gravity =	32.2	ft/sec^2		Peak Flow Velocity = 10 fps
Specific weight of water =	62.4	lb/ft^3		

Losses

Pipe Friction Loss:

Hazen-Williams Coefficient, C_{hw} =	*120*		Area, A (peak flow) =	15.00	ft^2
Pipeline Length, L=	6019.2	ft	Area, A (avg. flow) =	15.00	ft^3

Diameter, D --->	Initial Dia. =	**7.25**	ft ---->	Round up to the nearest standard	
(based on max. A)	Initial Dia. =	**87.0**	in. ---->	steel pipe size.	
	Adjusted Dia. =	**87.0**	in.	New Peak Velocity =	3.63 fps
	Adjusted Dia. =	7.25	ft.	Allowable Velocity =	**YES**
				New Avg. Velocity =	3.63 fps
				Allowable Velocity =	**YES**

Minor Losses Due to Elbows, Fittings, and Valves:
Assume the following % of Friction Loss = *20* %

Head Loss = Pipe Friction Loss + Minor Other Losses
Friction Loss = 2.8 ft
Total Head Loss = 3.3 ft

Total Pumping Head

Total Pumping Head = Elevation Head (Lift) + Head Loss
Pumping Head S.F. = **0** %
Total Pumping Head = 342.3 ft

Horsepower

Water Power = 5830 hp
Efficiency, n = **85.0%**
Shaft Power = 6860 hp

Summary:

Peak Discharge =	**150**	**cfs**	**Pumping Head =**	**340**	**ft**
Average Discharge =	**150.0**	**cfs**	**Horsepower =**	**6860**	**hp**
Pipe Diameter =	**87**	**inches**	**Capacity Factor**	**10.8%**	
Velocity =	**3.63**	**fps**	**Energy per Year =**	**4.84**	**GWh**
Water Delivery to Storage =	**11713**	**AF/yr**			

Wolcott Dam
Dam and Appurtenances

Wolcott Reservoir - Total Estimated Direct Construction Cost for Dam & Reservoir									
		Estimated Construction Cost				Engineering			
Alternative ID	Useable Storage Volume (AF)	Embankment (MM $)	Inlet/Outlet Works & Spillway (MM $)	Highway 131 Relocation (MM $)	Total w/Conting. (MM $)	and Admin. 15.0%	Permitting and Legal 5.0%	Total (MM $)	Storage Unit Cost ($/AF)
LWR - 45	45,000	71.5	12.9	12.0	96	14	5	116	2572
LWR - 50	50,000	75.0	13.1	12.0	100	15	5	120	2403
LWR - 80	80,000	92.3	16.0	12.2	121	18	6	145	1808
LWR - 95	95,000	101	18.1	12.5	131	20	7	158	1660
LWR - 110	110,000	110	19.2	12.5	142	21	7	170	1548
LWR - 150	150,000	128	23.1	12.7	164	25	8	197	1310

Opinion of direct construction costs is in 2004 dollars; ENR CCI index of 6862.
Cost opinion includes contingenct; does NOT include land and mitigation.

For Present Worth

Interest Rate	3.0%	
Period	30	years
PW Factor	19.60044	

Reference Cost Information								
	Original Direct Construction Cost/Estimate						Escalated Cost	
Project	Proj Cost (MM $)	Emb Cost (MM $)	Year	CCI	Emb Vol (MM CY)	Unit Cost ($/CY)	2004 CCI	Unit Cost ($/CY)
Eagle-CO Dam Study - (Main Emb)	73	58.3	1973	1895	75	0.78	6862	2.81
Aurora Dam	28.1	18.6	1989	4615	6	3.10	6862	4.61
Glade Reservoir Study (Full Build)	185	102.0	2002	6462	18	5.67	6862	6.02
Glade Reservoir Study (Stage 1)	142	62.1	2002	6462	8.3	7.48	6862	7.94
Wolford Reservoir	21.2	8.8	1994	5405	1.4	6.50	6862	8.25
Green Ridge Glade Resv	13.4	7.0	2004	6862	1.6	4.29	6862	4.29
Sulfur Gulch Reservoir Study	12.3	12.3	2001	6281	1.4	8.92	6862	9.75
Fortune Reservoir	15.1	13.0	2001	6281	4.3	3.02	6862	3.30
Reuter Hess Dam Design	42	26.4	2003	6581	6.8	3.92	6862	4.08

Wolcott Reservoir - Dam Embankment Cost Estimate (does not include outlet works, spillway or highway relocation)			
Wolcott Dam Alternative	Emb Vol (MM CY)	Unit Cost ($/CY)	Emb Cost (MM $)
LWR - 45	14.3	5	71.5
LWR - 50	15	5	75.0
LWR - 80	20.5	4.5	92.3
LWR - 95	22.4	4.5	100.8
LWR - 110	24.5	4.5	110.3
LWR - 150	32	4	128
Orig - 350	76.4	2.8	214
UWR - 50	16.3	5	81.5
UWR - 80	26.3	4.5	118.4

Reference Cost Information								
	Original Direct Construction Cost/Estimate						Escalated Cost	
Project	Proj Cost (MM $)	Hwy Cost (MM $)	Year	CCI	Hwy Lngth (MI)	Unit Cost (MM $/MI)	2004 CCI	Unit Cost (MM $/MI)
Eagle-CO Dam Study- (Highway 131 Reloc)	73	3.7	1973	1895	5.5	0.67	6862	2.4
Aurora Dam (New 2-lane Site Access Rd)	28.1	0.6	1989	4615	0.8	0.75	6862	1.1
Glade Reservoir Study (Hwy 287 Reloc)	185	15.3	2002	6462	7	2.19	6862	2.3
Wolford Reservoir (Highway 40 Reloc)	21.2	3.9	1994	5405	2	1.97	6862	2.50
Green Ridge Glade Resv (New 2-lane Co Rd)	13.4	1.3	2004	6862	1.5	0.86	6862	0.86

Wolcott Reservoir - Highway 131 Relocation Cost Estimate			
Wolcott Dam Alternative	Hwy Lngth (MI)	Unit Cost (MM $/MI	Hwy Cost (MM $)
LWR - 45	5	2.4	12.0
LWR - 50	5	2.4	12.0
LWR - 80	5.1	2.4	12.2
LWR - 95	5.2	2.4	12.5
LWR - 110	5.2	2.4	12.5
LWR - 150	5.3	2.4	12.7
Orig - 350	5.5	2.4	13.2
UWR - 50	4.5	2.4	10.8
UWR - 80	4.5	2.4	10.8

Reference Cost Information

Project	Original Direct Construction Cost/Estimate				Escalated Cost		Comments
	Proj Cost (MM $)	OW Cost (MM $)	Year	CCI	2004 CCI	OW Cost ($)	
Eagle-CO Dam Study - (OW)	73	4.3	1973	1895	6862	15.5	4,400' 60" to 36" dia, no tower/bridge
Aurora Dam (OW)	28.1	4.4	1989	4615	6862	6.5	1,000' 72" dia & 650' 48" dia, w/ 100' high tower/bridge
Glade Reservoir Study (OW)	185	12.5	2002	6462	6862	13.2	2,000' 108" dia w/ 200' high tower/bridge
Wolford Reservoir (OW)	21.2	4.8	1994	5405	6862	6.1	800' 48" dia w/ tower/bridge
Green Ridge Glade Resv (OW)	13.4	3.0	2004	6862	6862	3.0	700' 54"dia, w/ 90' high tower/bridge
Fortune Reservoir (OW)	15.1	0.5	2001	6281	6862	0.6	800' 36" dia, no tower/bridge
Reuter Hess Reservoir (OW)	42	12.8	2003	6581	6862	13.3	1,600' 78" & 30" dia, w/ 125+' OW/Spillway tower/bridge

Wolcott Reservoir - Outlet Works Cost Estimate

Wolcott Dam Alternative	Outlet Conduit			Stream Release (MM $)	Reservoir Intake (MM $)	Total OW (MM $)	Comments
	Length (FT)	Unit Cost ($/FT)	Cost (MM $)				
LWR - 45	1,795	2,200	3.9	3.0	6.0	12.9	1,800' 87" pressure & 96" gravity, 136' tower/bridge
LWR - 50	1,874	2,200	4.1	3.0	6.0	13.1	1,900' 87" pressure & 96" gravity, 142' tower/bridge
LWR - 80	2,178	2,300	5.0	3.6	7.4	16.0	2,200' 87" pressure & 96" gravity, 165' tower/bridge
LWR - 95	2,376	2,400	5.7	4.0	8.4	18.1	2,400' 87" pressure & 96" gravity, 180' tower/bridge
LWR - 110	2,482	2,400	6.0	4.2	9.0	19.2	2,500' 87" pressure & 96" gravity, 188' tower/bridge
LWR - 150	2,785	2,600	7.2	5.0	10.8	23.1	2,800' 87" pressure & 96" gravity, 211' tower/bridge
UWR - 50							
UWR - 80							

Outlet Conduit Cost - ($8/dia-inch * combined dia) * 1.5 for encasement = $2,196/lf. Say $2,200/lf for lowest dam, increase for higher dams (encasement)

Stream Release Cost - $1m for impact basin on 96" gravity, plus $1m for control structures on pressure lines and $1m for valves; increase for greater head.

Reservoir Intake Cost - (Low-level intake @ $2m, plus $4m for 142' tower & bridge. Increase tower/bridge by square of increase in height.